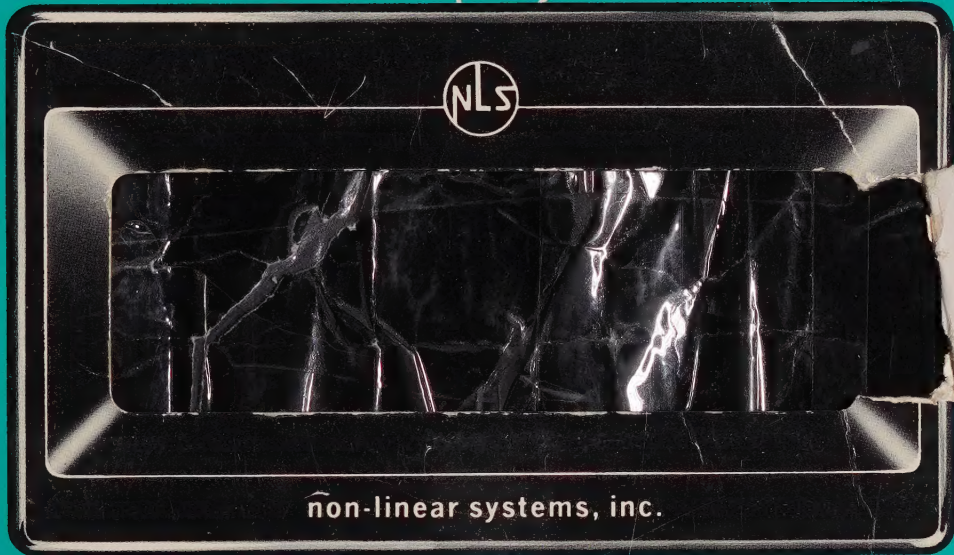


110-0101

1
3 9
4
8
7 +
1 2

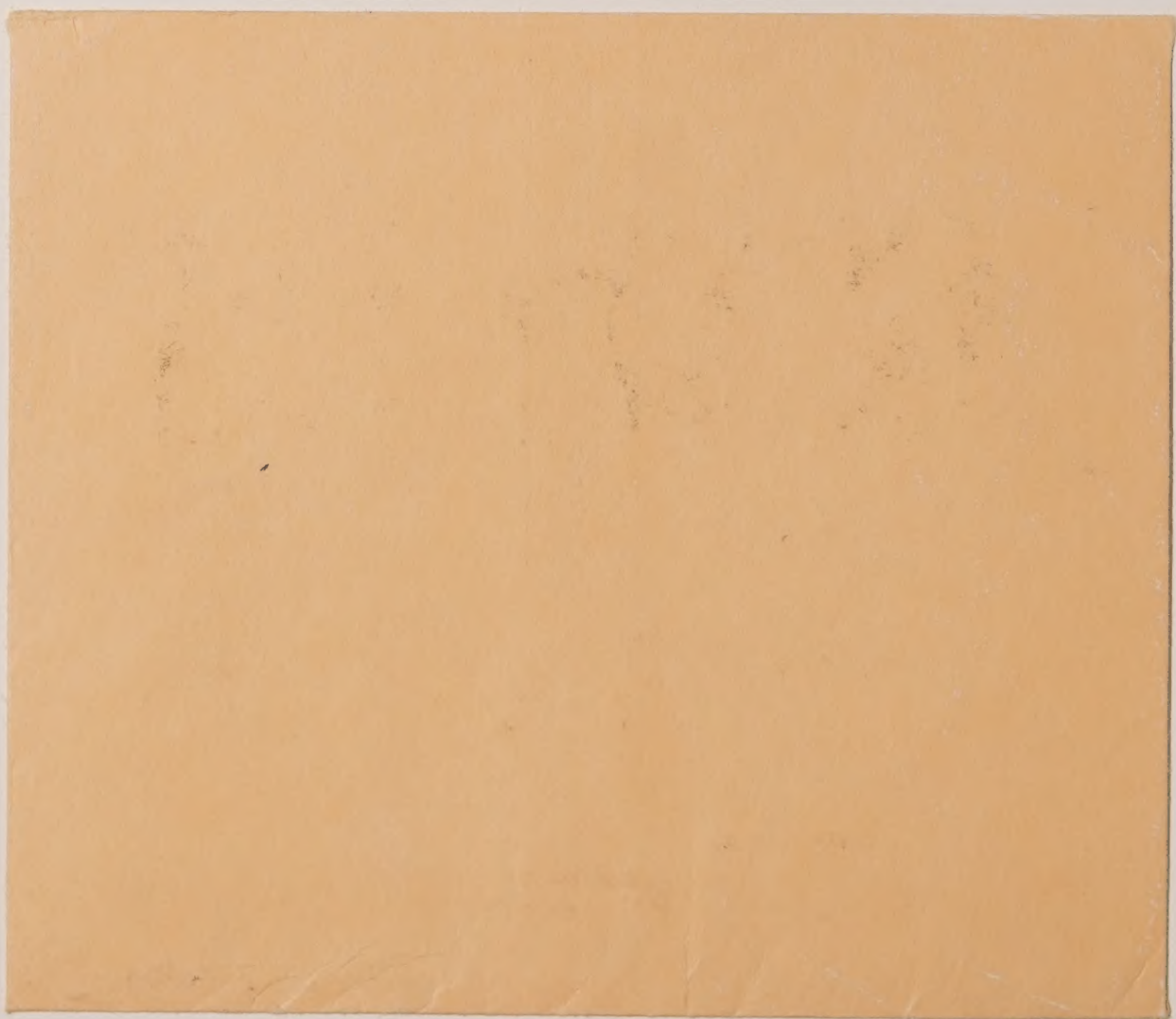


8 7
5 9
3 1
4 +
6 2
7
8 +
3 5
2
5 1
7
9 4
3

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DEL MAR, CALIFORNIA

1
3 5
6



Models V35B and V35RB
Digital Voltmeter
Instruction Manual

Part 2



Notes:

1. The V35B Digital Voltmeter Instruction Manual is in two parts. Part 1, supplied in the front cover envelope of Part 2, contains text relating to the figures, tables, schematics and parts list data of Part 2.
2. The *Appendix* contains additional V35RB information.

This manual is for instrument Serial No. _____



Non-Linear Systems, Inc.
Del Mar, California

V35B; 1st Printing; 500; Sept. 1962

V35B/V35RB; Revised, 500; Jan. 1963

V35B/V35RB; 500; June 1963

V35B/V35RB; 500; Jan. 1964

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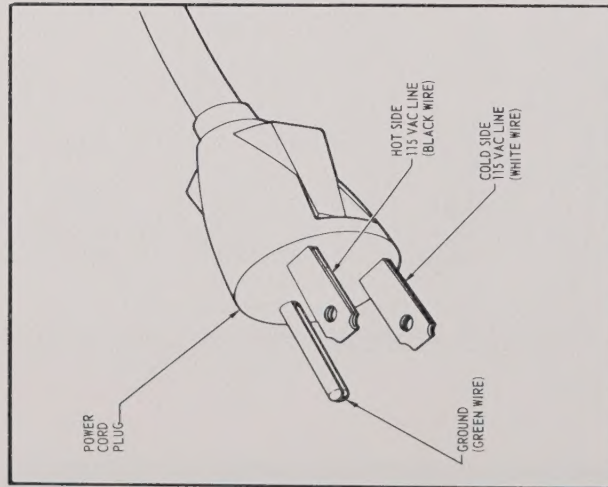


Figure 1. Power Plug Pin Coding.

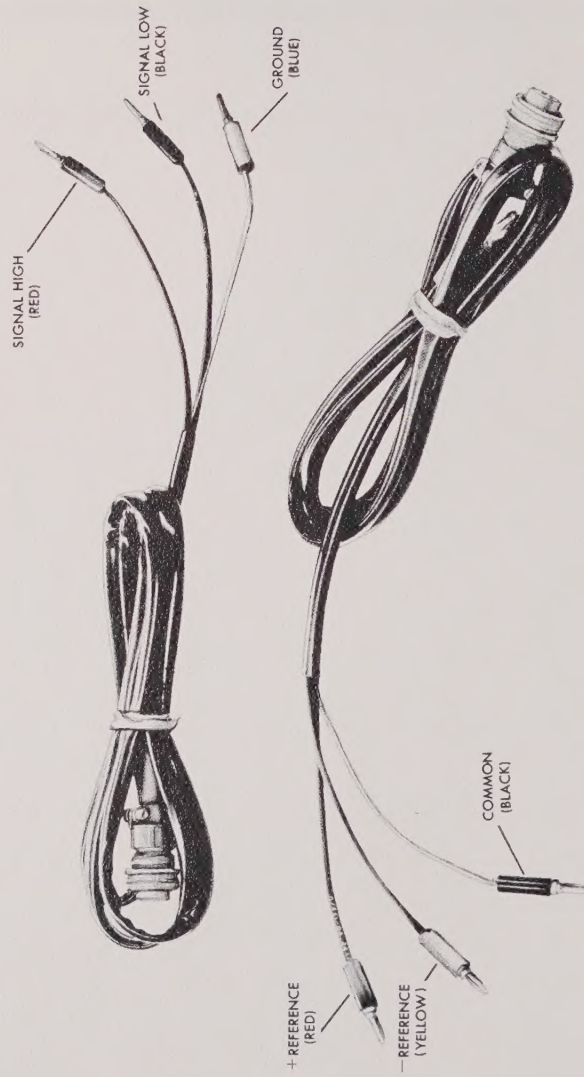


Figure 2. V35B Cables. Top: Signal Input. Bottom: External Reference Supply.

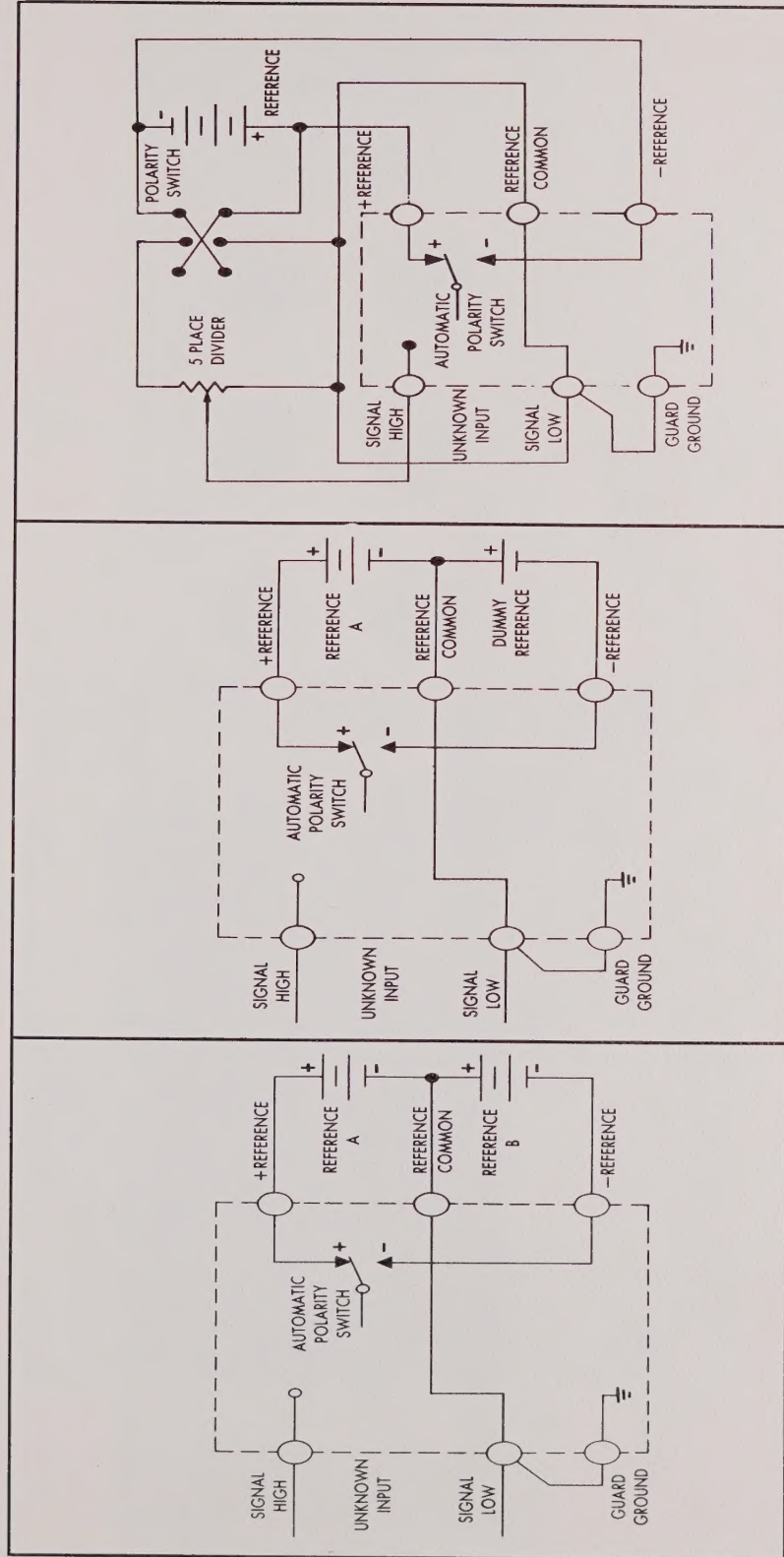


Figure 3. External Reference Supply Connection . . . To Measure Positive and Negative Input Voltages.

Figure 4. External Reference Supply Connection . . . To Measure Input Voltages of a Single Circuit.

Figure 5. Ratiometer Linearity Test Circuit.

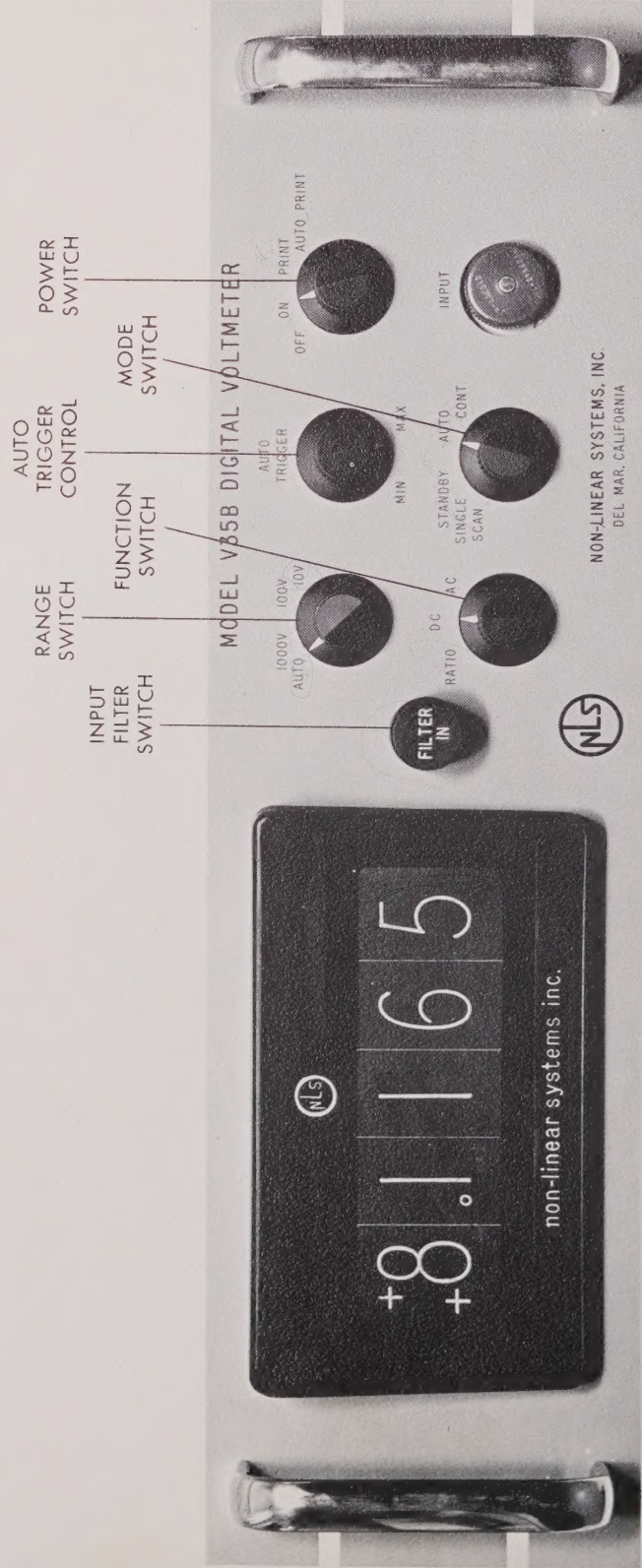


Figure 6. Front Panel Controls.

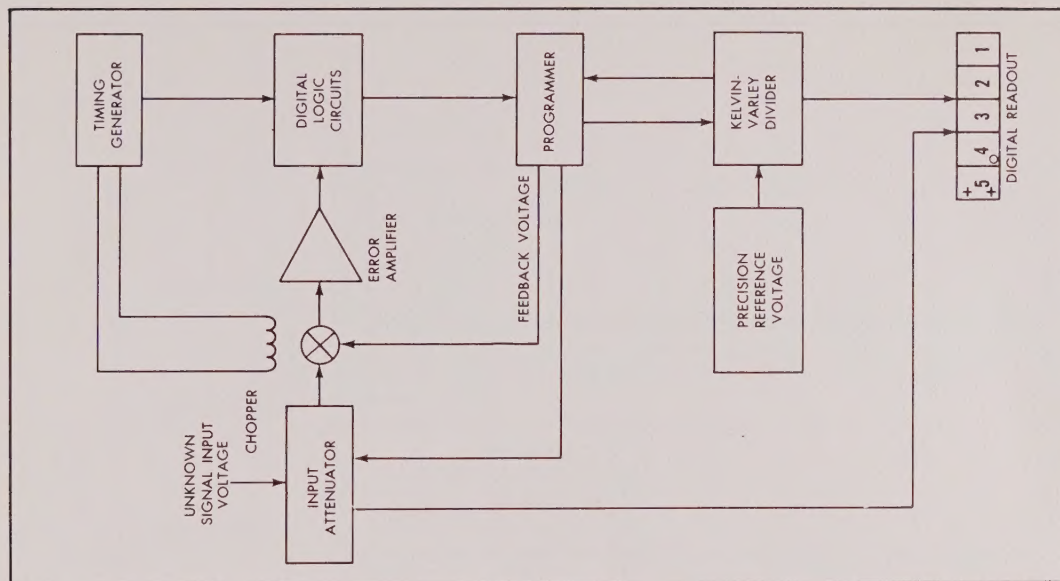


Figure 8. Block Diagram of V35B.

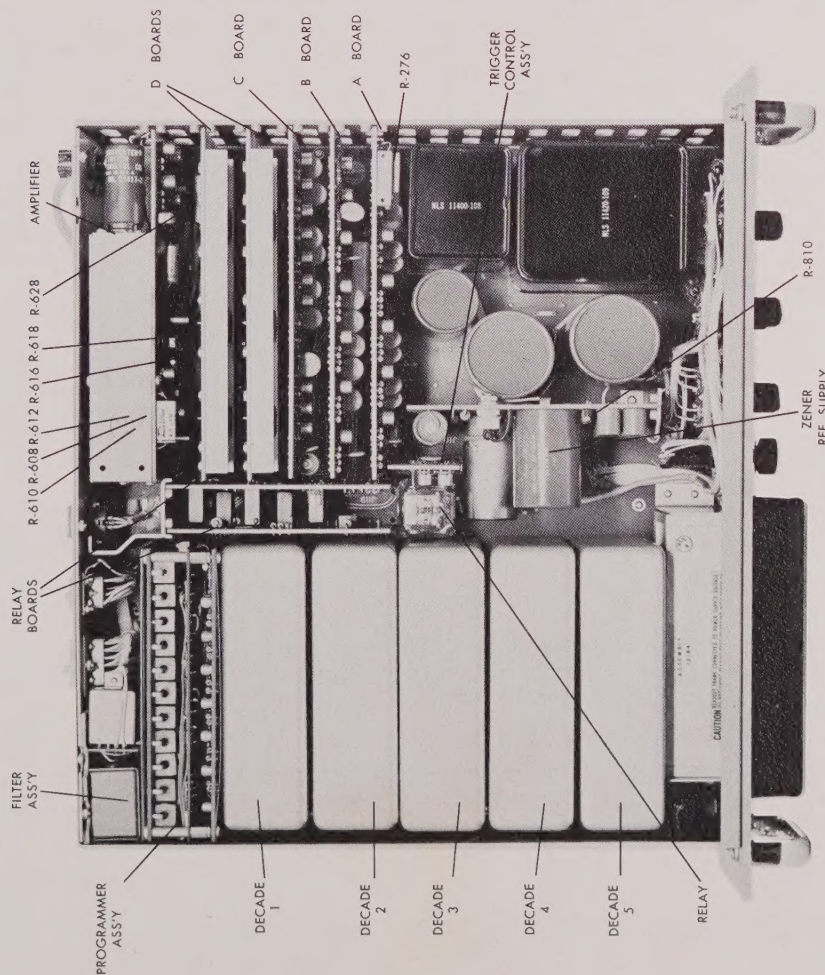


Figure 7. Calibration Adjustment Points and Plug-in Component Identification.

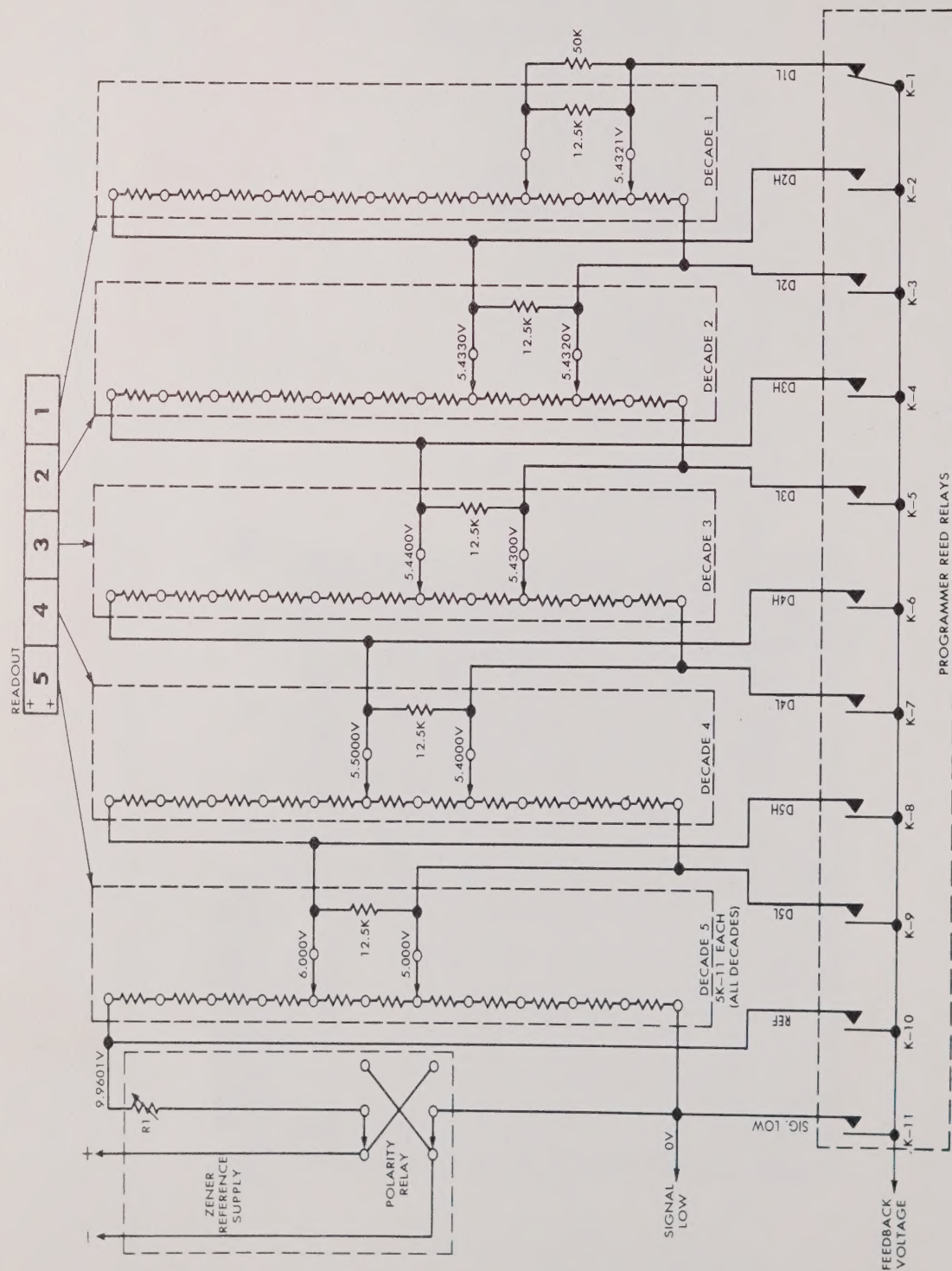
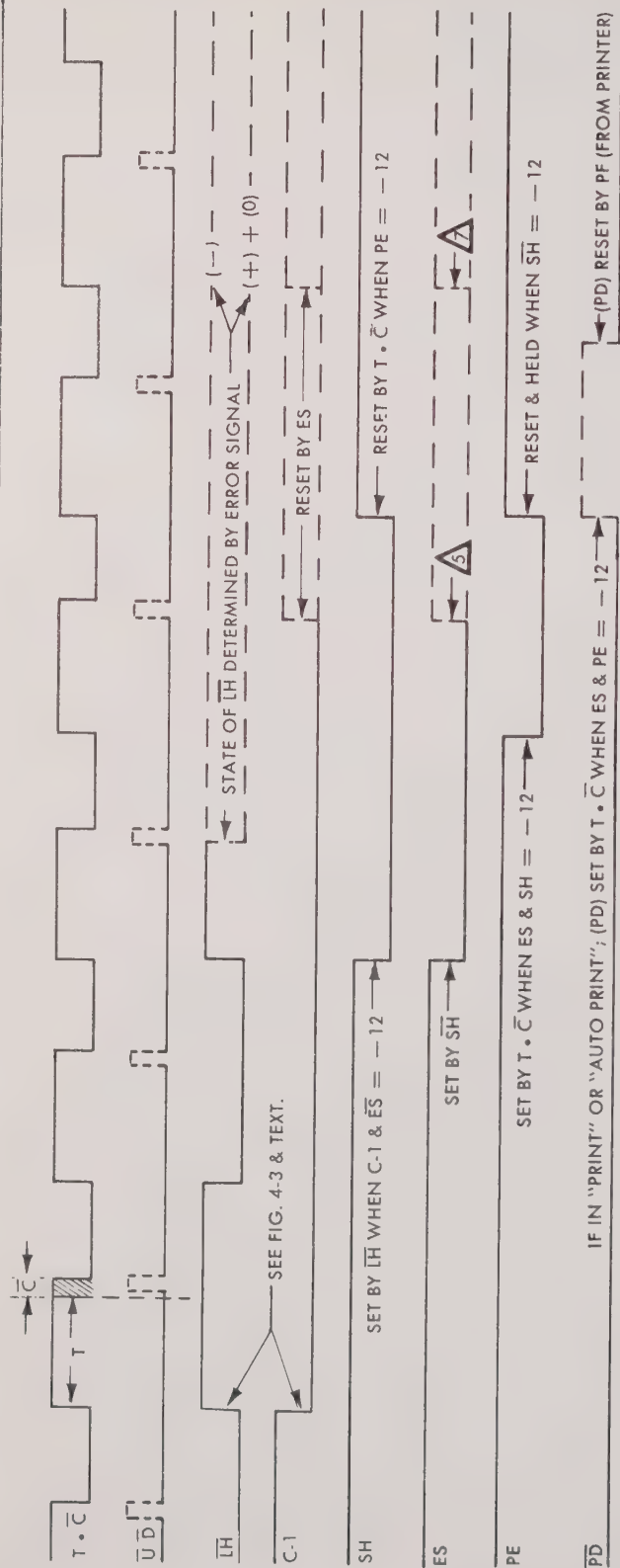


Figure 9. Stepping Switch, Kelvin-Varley Divider, and Relay Portion of the Programmer.

COUNTER POSITION	FEEDBACK	LOW-HIGH FLIP-FLOP	ERROR	FORWARD FLIP-FLOP	BACKWARD FLIP-FLOP	READOUT SIGNALS ZEROS	SIGNALS NINES	OUTPUT	NOTES
6	Ref. Low	LH	(-)	—	—	—	—	ΔP	Upon receipt of ΔP , the polarity is reversed & (-) becomes (+) + (0).
*6	Ref. Low	LH	(+) + (0)	F	$\bar{B}$	$\bar{D}_5 0$	—	Decade 5	Inhibits the turn-around signal to the "F" Flip-Flop and steps Decade 5 to Zero.
6	Ref. High	$\bar{LH}$	(+) + (0)	—	—	—	—	ΔQ	One ΔQ per bit is provided until (-) error is obtained.
*5	Dec. 5 Low	LH	(+) + (0)	F	$\bar{B}$	$\bar{D}_4 0$	—	Decade 4	Steps Decade 4 to Zero.
5	Dec. 5 Low	LH	(-)	—	B	$\bar{D}_5 0$	—	Decade 5	Steps Decade 5 until (+) + (0) error is obtained (to Zero).
5	Dec. 5 High	$\bar{LH}$	(+) + (0)	—	B	—	$\bar{D}_5 9$	Decade 5	Steps Decade 5 until (-) error is obtained.
*4	Dec. 4 Low	LH	(+) + (0)	F	$\bar{B}$	$\bar{D}_3 0$	—	Decade 3	Steps Decade 3 to Zero.
4	Dec. 4 Low	LH	(-)	—	B	$\bar{D}_4 0$	—	Decade 4	Steps Decade 4 until (+) + (0) error is obtained (to Zero).
4	Dec. 4 High	$\bar{LH}$	(+) + (0)	—	B	—	$\bar{D}_4 9$	Decade 4	Steps Decade 4 until (-) error is obtained.
3	Dec. 3 Low	LH	(-)	—	B	$\bar{D}_5 0$	—	Decade 3	Steps Decade 3 until (+) + (0) error is obtained (to Zero).
3	Dec. 3 High	LH	(+) + (0)	—	B	—	$\bar{D}_3 9$	Decade 3	Steps Decade 3 until (-) error is obtained.
2	Dec. 2 Low	LH	(-)	—	B	$\bar{D}_5 0$	—	Decade 2	Steps Decade 2 until (+) + (0) error is obtained (to Zero).
2	Dec. 2 High	$\bar{LH}$	(+) + (0)	—	B	—	$\bar{D}_5 9$	Decade 2	Steps Decade 2 until (-) error is obtained.
1	Dec. 1 Low	LH	(-)	—	B	$\bar{D}_4 0$	—	Decade 1	Steps Decade 1 until (+) error is obtained (to Zero).
1	Dec. 1 Low	$\bar{LH}$	(+)	—	B	—	$\bar{D}_4 9$	Decade 1	Steps Decade 1 until error is not (+).

Figure 10. Tabular Presentation of V35B Logic.



NOTES:

1. "SET" OR RESET OCCURS WHEN INDICATED TERM GOES FROM -12 TO 0 VOLTS, EXCEPT AS NOTED.
2. $\overline{PD}$ IS HELD IN THE RESET CONDITION WHEN NOT IN "PRINT" OR "AUTO PRINT".
3. $\overline{ES}$ IS HELD IN THE SET CONDITION WHEN $\overline{PD} = -12$ (SET).
4. SOLID LINES INDICATE THAT EVENT ALWAYS OCCUR AT THE TIMES AND IN THE STATE SHOWN; — DASHED LINES INDICATE THAT TIMES AND/OR STATES ARE DEPENDENT ON SPECIFIED CONDITIONS.

ΔS IF IN "AUTO PRINT", $\overline{ES}$ WILL BE RESET BY $\overline{U.D}$ WHEN $P.E = -12$, (IF $\overline{U.D}$ EXISTS).

6. IF $\overline{ES}$ RESET, $\overline{PD}$ CANNOT BE SET AND THE PRINT SIGNAL IS INHIBITED.

ΔA IF $\overline{ES}$ IS NOT RESET AT ΔS IT WILL REMAIN SET UNTIL MS (TRIGGER CONTROL FF) IS SET (-12) AND THE FIRST $T.C$ (SEE NOTE 1) RESETS $\overline{ES}$. THE MS FF IS NOT SHOWN ON THIS CHART SINCE THERE IS NO SPECIFIC TIMING RELATIONSHIP.

Figure 11. Chart: End of Scan, Print Timing, and Logic.

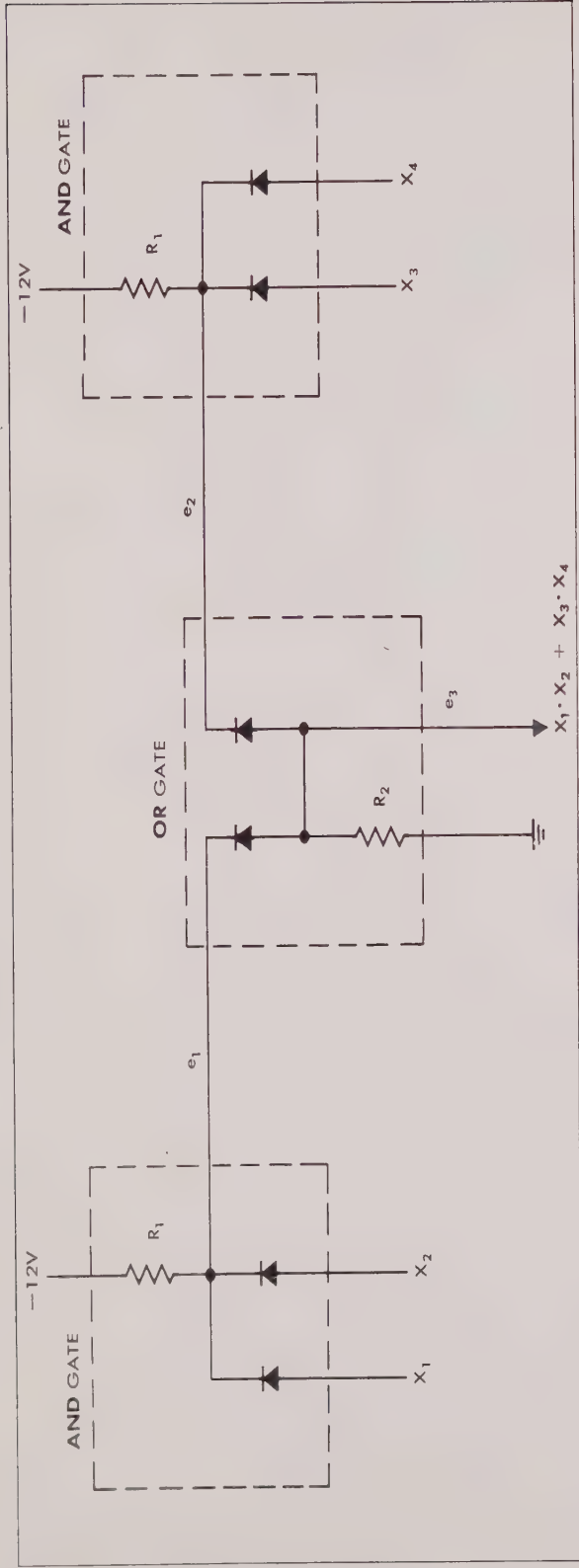


Figure 12. AND-OR Gates.

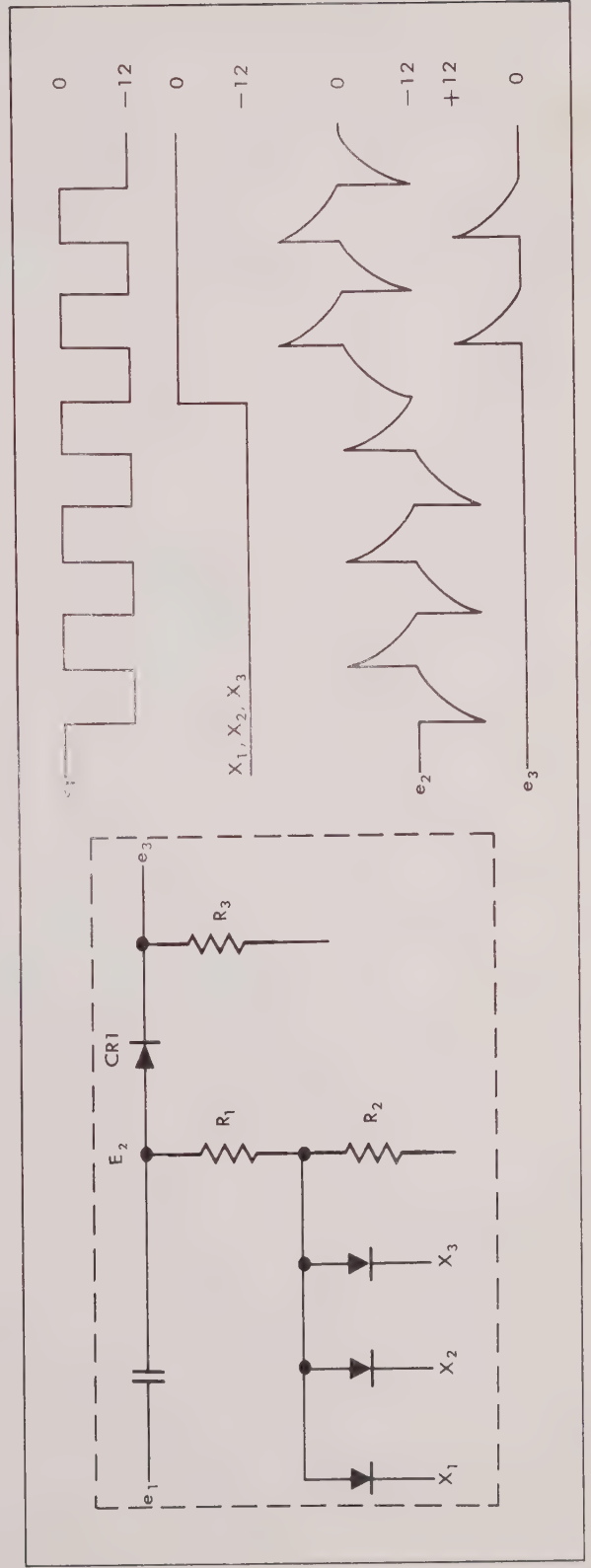


Figure 13. AC Coupled AND Gate.

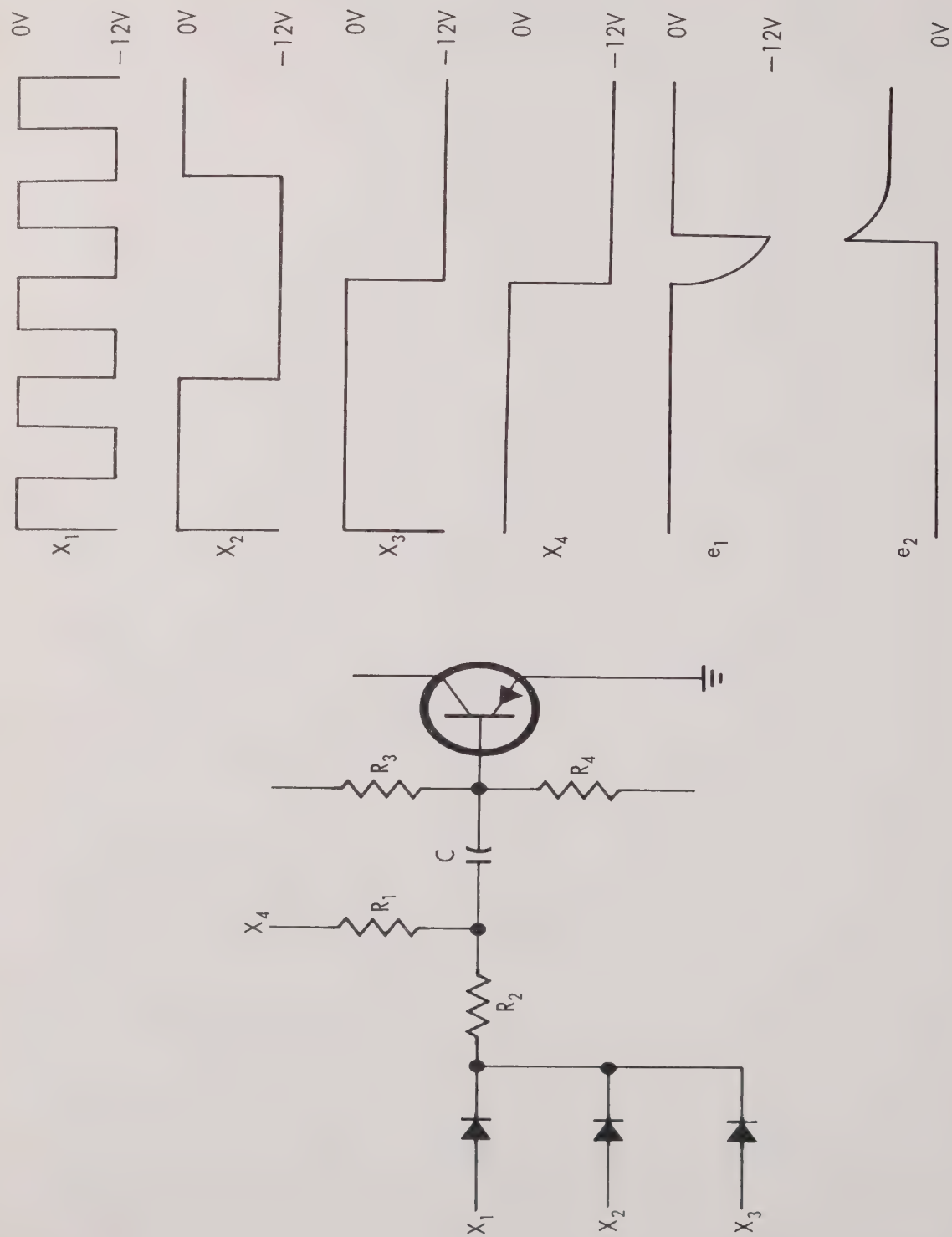
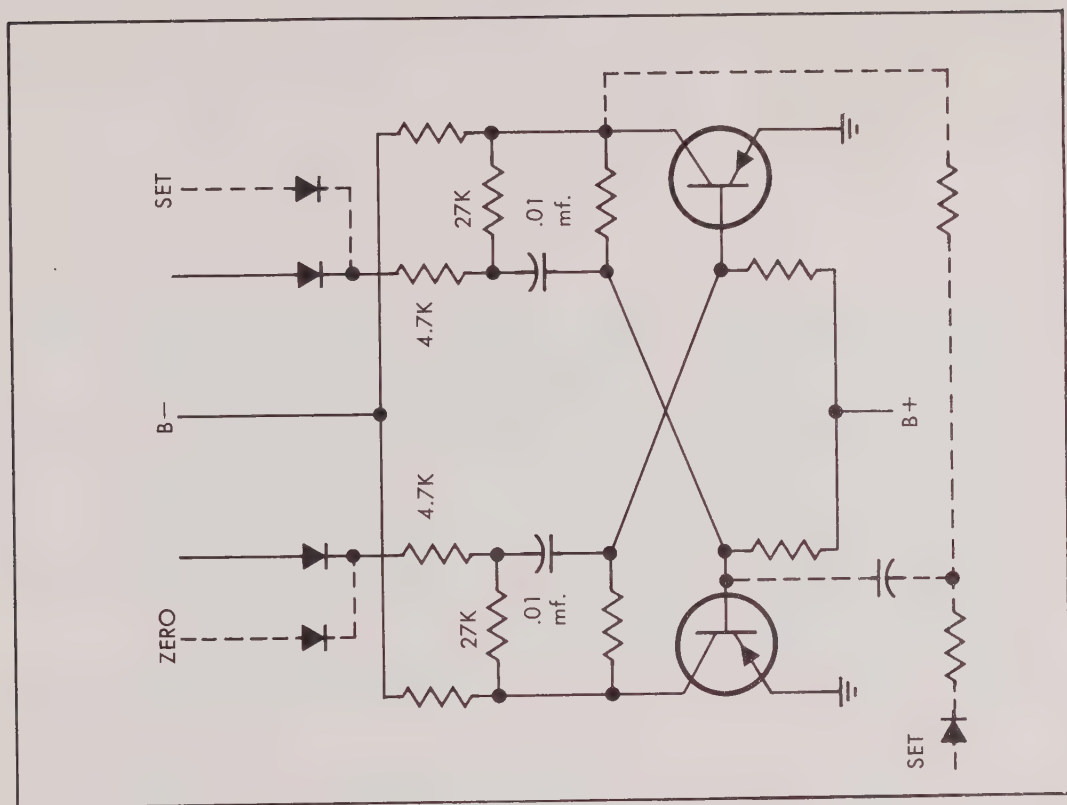
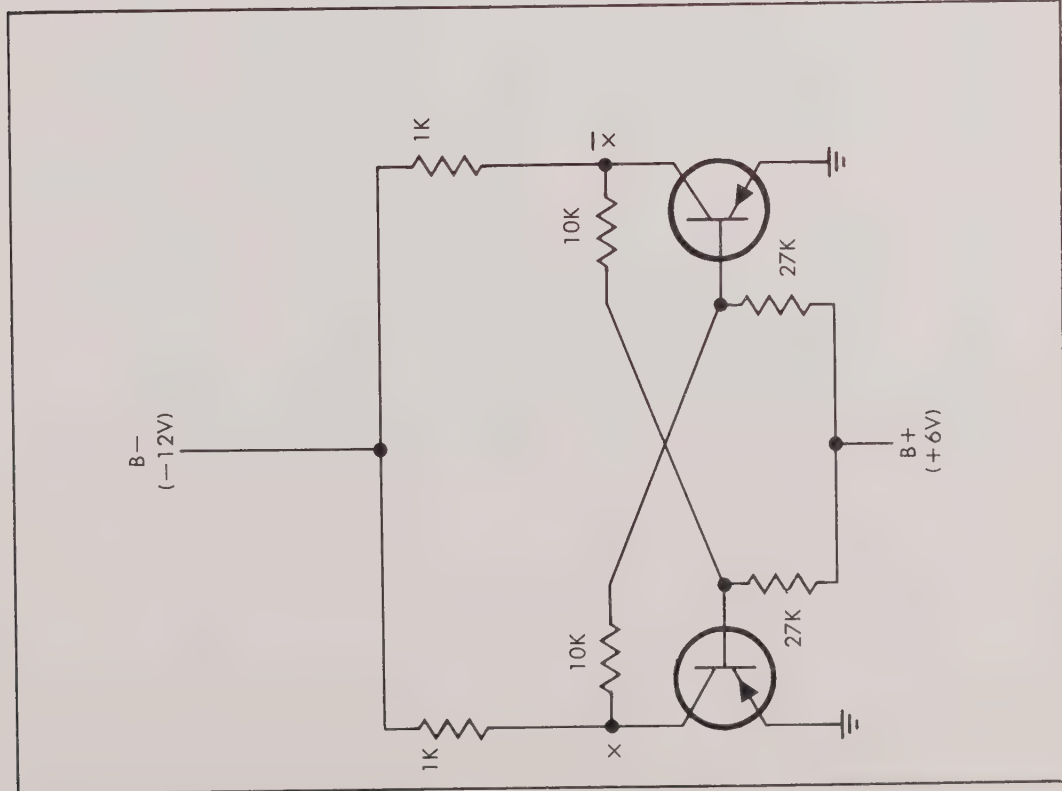


Figure 14. Flip-flop Trigger Circuits.



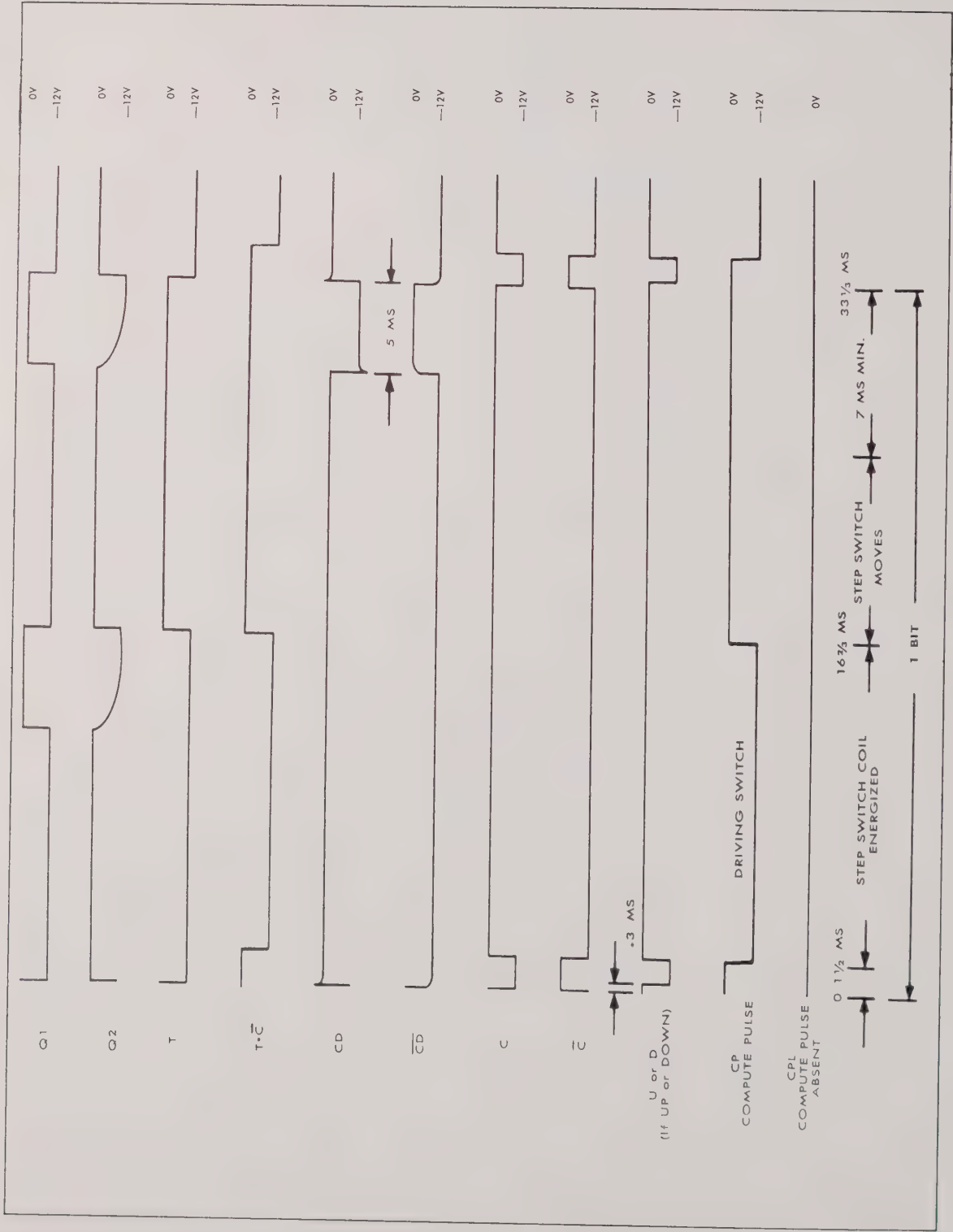


Figure 17. Chart: Timing.

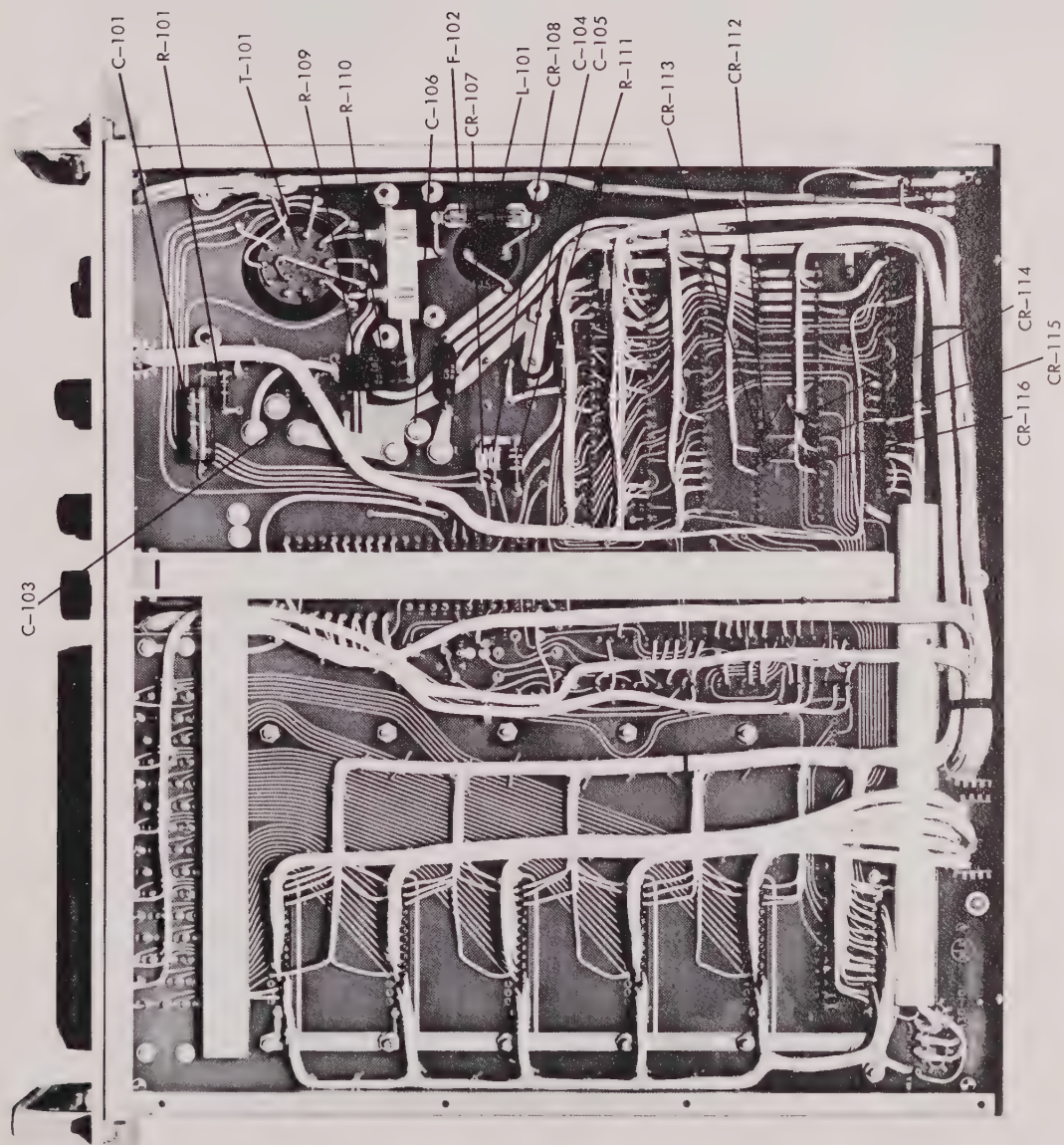


Figure 18. Digital Voltmeter, Bottom View.

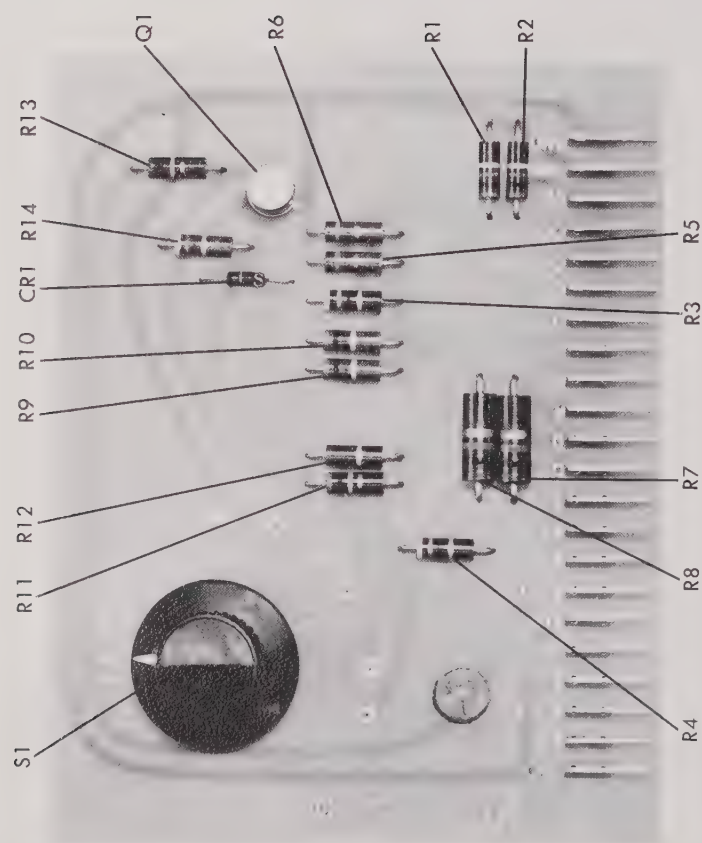


Figure 19. Dummy Amplifier Used to Simulate Error Amplifier.

Test No.	SWITCH POSITIONS			Special Instructions	Dummy Amplifier	FORWARD SCAN			Reverse Scan Completed (C-1)	NOTES:
	Range	Power	Mode			Start (C-1)	Intermediate	Finish (C-6)		
1	AUTO	ON	SS	GROUND $\overline{P}$	U	?	?	+xxxx.x	+0000.0	1. Set Function Switch to "DC", all tests. 2. SS = Single Scan; all ways complete ALL other indicated settings before operating SS. A Switch dummy rapidly from previous to indicated position. A With dummy amp. (DA) at U, D, set mode switch (MS) to auto; no scan should occur. When DA is set to U or D, a scan to C-6 should result. Return MS to st'by and set DA to the opposite position (U or D as req'd); a reverse scan to C-1 should result. With DA at UD set MS to Cont., a scan to C-6 should result. A These lines (2) show the complete cycle initiated by the indicated error pulse. This pulse starts the Rev. scan (from C-6 to C-1) and the presence of the error pulse at ES automatically recycles the Fw'd scan to C-6.
2	AUTO	ON	—	GROUND $\overline{P}$	D	+0000.0	NO CHANGE	+0.0000	+9.9990	
3	AUTO	ON	SS	GROUND $\overline{P}$	D	+9.9990	NO CHANGE	+9.9990	+9.9999	
4	AUTO	ON	—	GROUND $\overline{P}$	D	+9.9999	NO CHANGE	+9999.9	+0000.0	
5	AUTO	ON	SS	GROUND $\overline{P}$	A U	—0000.0	NO CHANGE	—0.0000	—9.9990	
6	AUTO	ON	—	GROUND $\overline{P}$	U	—0000.0	NO CHANGE	—0.0000	—0000.0	
7	AUTO	ON	SS	GROUND $\overline{P}$	D	—9.9990	NO CHANGE	—9.9990	—9.9999	
8	AUTO	ON	—	GROUND $\overline{P}$	U	—9.9999	NO CHANGE	—9999.9	—0000.0	
9	AUTO	ON	SS	CLEAR $\overline{P}$, GROUND $\overline{P}$	U	—0000.0	NO CHANGE	—0.0000	—0000.0	
10	AUTO	ON	—	CLEAR $\overline{P}$, GROUND $\overline{P}$	U $\overline{D}$	—9.9990	NO CHANGE	—9.9990	—9.9999	
11	AUTO	ON	SS	CLEAR $\overline{P}$, GROUND $\overline{P}$	U	—9.9990	NO CHANGE	—9.9990	—9.9999	
12	AUTO	ON	—	CLEAR $\overline{P}$, GROUND $\overline{P}$	A D	—9.9999	NO CHANGE	—9999.9	—0000.0	
13	AUTO	ON	SS	CLEAR $\overline{P}$, GROUND $\overline{P}$	D	—0000.0	NO CHANGE	—0.0000	—0000.0	
14	AUTO	ON	—	CLEAR $\overline{P}$, GROUND $\overline{P}$	A U	—0000.0	NO CHANGE	—0.0000	—0000.0	
15	AUTO	ON	SS	CLEAR $\overline{P}$	D	—0000.0	NO CHANGE	—0.0000	—0000.0	
16	AUTO	ON	—	CLEAR $\overline{P}$	U $\overline{D}$	—0000.0	NO CHANGE	—0.0000	—0000.0	
17	AUTO	ON	SS	CLEAR $\overline{P}$	U	—0000.0	NO CHANGE	—0.0000	—0000.0	
18	AUTO	ON	—	CLEAR $\overline{P}$	U	—0000.0	NO CHANGE	—0.0000	—0000.0	
19	AUTO	ON	SS	CLEAR $\overline{P}$	D	—0000.0	NO CHANGE	—0.0000	—0000.0	
20	AUTO	ON	—	CLEAR $\overline{P}$	U $\overline{D}$	—0000.0	NO CHANGE	—0.0000	—0000.0	
21	AUTO	ON	SS	CLEAR $\overline{P}$	D	—0000.0	NO CHANGE	—0.0000	—0000.0	
22	AUTO	ON	—	CLEAR $\overline{P}$	U	—0000.0	NO CHANGE	—0.0000	—0000.0	
23	1000	ON	SS	CLEAR $\overline{P}$	U	—0000.0	NO CHANGE	—0.0000	—0000.0	
24	100	ON	—	CLEAR $\overline{P}$	D	—0000.0	NO CHANGE	—0.0000	—0000.0	
25	100	ON	SS	CLEAR $\overline{P}$	U	—0000.0	NO CHANGE	—0.0000	—0000.0	
26	10	ON	—	CLEAR $\overline{P}$	D	—0000.0	NO CHANGE	—0.0000	—0000.0	
27	10	ON	SS	CLEAR $\overline{P}$	U	—0000.0	NO CHANGE	—0.0000	—0000.0	
28	10	ON	—	CLEAR $\overline{P}$	D	—0000.0	NO CHANGE	—0.0000	—0000.0	
29	10	PRINT	SS	CLEAR $\overline{P}$	U	—0000.0	NO CHANGE	—0.0000	—0000.0	
30	10	PRINT	—	CLEAR $\overline{P}$	D	—0000.0	NO CHANGE	—0.0000	—0000.0	
31	10	PRINT	SS, AUTO, CONT.	Try All Mode Switch Positions	U	N O S C A N				
32	10	ON-THEN AUTO PRINT	SS	Try All Mode Switch Positions	U	+0.0000	NO CHANGE	+0.0000	+0.0000	
33	10	ON-THEN AUTO PRINT	—	Try All Mode Switch Positions	A D	—0.0000	NO CHANGE	—0.0000	—0.0000	
34	10	ON-THEN AUTO PRINT	—	Try All Mode Switch Positions	A D	+0.0000	NO CHANGE	+0.0000	+0.0000	
35	10	ON-THEN AUTO PRINT	—	Try All Mode Switch Positions	A U	—0.0000	NO CHANGE	—0.0000	—0.0000	
36	10	ON-THEN AUTO PRINT	—	Try All Mode Switch Positions	A U	+0.0000	NO CHANGE	+0.0000	+0.0000	
37	10	ON-THEN AUTO PRINT	—	Try All Mode Switch Positions	D THEN U $\overline{D}$	—0.0000	NO CHANGE	—0.0000	—0.0000	
38	10	ON-THEN AUTO PRINT	SS, AUTO, CONT.	Try All Mode Switch Positions	U	N O S C A N				
39	10	ON	St dby. When Note A	Try All Mode Switch Positions	NOTE A	?	?	?	?	

Figure 20. Dummy Amplifier Test Procedure.

LOCALIZING HINTS & INSTRUCTIONS

PROBABLE AREA OF TROUBLE

COUNTER CONDITIONS

SYMPTOM

TEST NO.

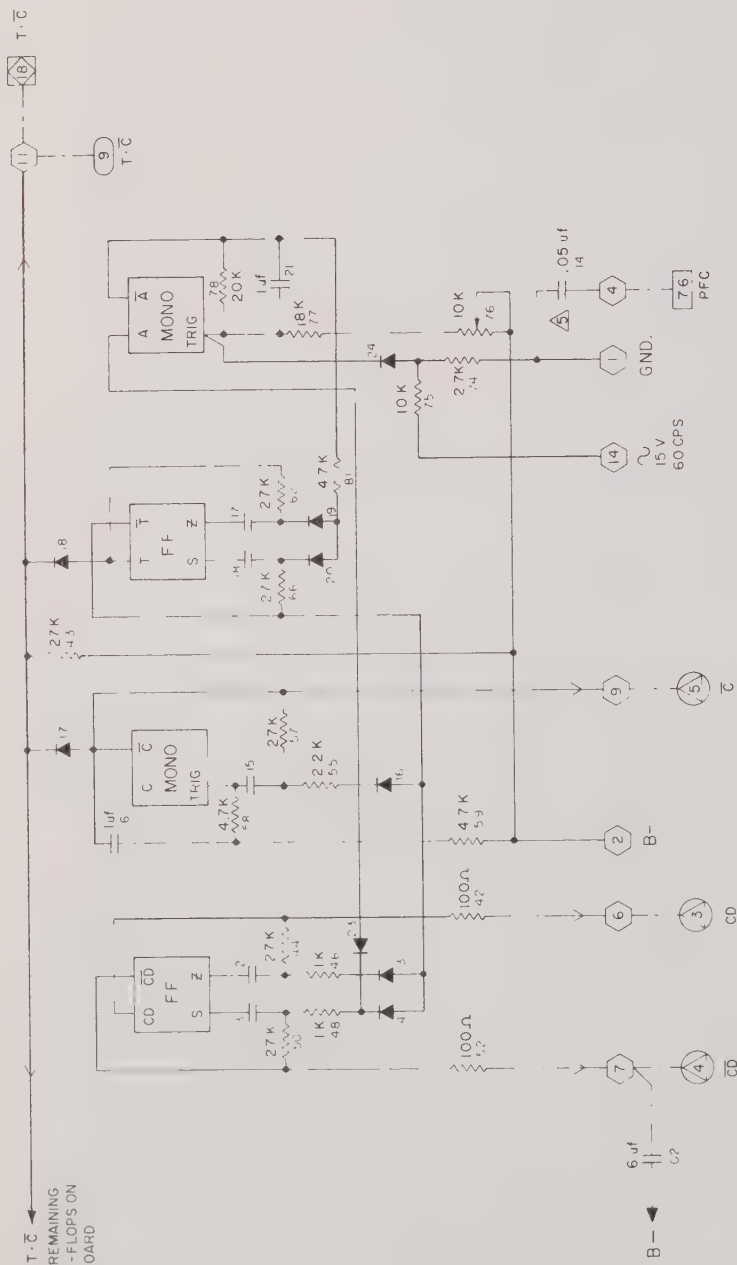
1.	Faulty Fwd. Scan	Not at C-1 and not at C-6 initially, or more than one output	11430-731	If more than one counter output is true (C-1 thru C-6) at a time, the fault lies in one of the FF's concerned, or in their drive matrix. With C-1 grounded, approx 6V should be measured across CR-3.
2.	Faulty Rev. Scan	Stops Before C-6	11430-731 or 11430-300	CR-28 or associated circuitry on 11430-731 or connections to 11430-300. ES not true; defective ES FF on 11430-300.
		At C-6 initially	11430-731, 11430-300, or 11430-860	Circuits associated with the forward drive line (11430-731), connections to 11430-300; faulty ES, PD or F FF. Proceed to Test No. 39, check pin 10 of 11430-860 for trigger pulse called for by the mode switch position.
3.	Faulty Rev. Scan	Remains at C-1	11430-731	Circuits associated with the rev. drive line including gate components, Q-13, C-13, CR-23, CR-25, CR-26, C-12, etc.
		Remains at C-6	11430-300	LH FF or its triggers, B FF, pin 10 (M-2) should be false, defective turn-around gate (CR's 29, 30, 31, 32, 33 & 36).
		Reverse to C-1	11430-200	(-) FF or CP invert-amp (Q-1 & Q-2).
		Reverse Scan Will Stop at Faulty Decade	11420-500 (Two Boards)	Any fault in any of the 5 amplifiers that would cause the D ₁ C thru D ₅ C outputs to be at GND.
		Reverse to C-1	11420-400	Defective P FF.
4.	Decade Runs Continuously	Reverse to C-1	11420-800	K-4 defective.
		Reverse Scan Will Stop at Faulty Decade	11430-734	"Zero" lamp diode, associated with the decade in question, or wiring is faulty. Example: CR-78 for Decade 5.
		One Decade Fails to Run	11430-734	Affected decade drive signal at ground. Example: D ₅ S may be shorted to GND or open; check CR-80, R-6, R-30 and associated circuitry.
		All Decades Fail to Run	11420-500	Faulty power amplifier or associated wiring.
		Stopping to Compute	11420-700	Faulty decade or main board connector or wiring.
5.	Decimal Incorrect	Reverse to C-1	11430-734	No B— to pulling resistors, R-1, R-3, R-5, R-8, R-9 etc.; or (-), LH, or B may be permanently shorted to GND.
		Reverse to C-1	11(5) (4) 30-100	No —15V to D board or decades.
		Reverse to C-1	11430-734	Q-3, Q-4 FF not set; check FF and trigger circuitry. Also check Q-1 & Q-2 inverters and associated circuitry.
		Reverse to C-1	11420-800	K-1 and/or K-3, and associated circuitry.
		Reverse to C-1	11420-400	Defective Q and/or R FF, and associated circuitry.
6.	Same as 2a	Same as 2a	Same as 2a	Same as test 2a.
		Same as 2c	Same as 2c	Same as 2c except nine lamp diodes are involved.

TEST NO. SYMPTOM COUNTER CONDITIONS PROBABLE AREA OF TROUBLE LOCALIZING HINTS & INSTRUCTIONS

10	c	Same as 2d	Same as 2d	Same as 2d	
	d	Same as 2e	Same as 2e	Same as 2e	
6	e	1st Decade Not Zero	Reverse to C-1	11430-734	(+) + (0) diode (CR-48) or associated wiring.
	a	1st Decade Still Zero	Reverse to C-1	11430-734	CR-42, CR-43, CR-44, CR-48 grounded or R-22 open (or assoc. circuitry).
12	b	1st Decade Runs Continuously	Reverse to C-1	11430-734	CR-42 or associated wiring open.
		Decimal Incorrect	C-6	11420-400	Defective Q and/or R FF or associated circuitry.
13				11420-800	K-1 and/or K-3 or associated circuitry.
				11430-734	CR-87, C-2, CR-28, R-7 or associated circuitry.
8	14	Decimal Incorrect (Returned to Test No. 6 Indication)	Reverse to C-1	11430-734	Collector of Q-4 should have gone to ground at C-6, test 6. If not, check C-1, Q-3, Q-4 & associated circuitry. Also check CR-83.
	23	Decimal Incorrect		11420-800	K-1 and/or K-3 or associated circuitry.
25		Same as 23		11420-400	CR-6, CR-18 or associated circuitry.
		Same as 23		Same as 23	Same as 23 except CR-5 & CR-14.
27		No Print Command		Same as 23	Same as 23 except CR-4.
	30			11430-300	SH not set, PE not set, PD not set, in that order at end of scan; see Fig. 11. Check circuitry associated with these FF's.
37				11420-400	PC mono stable not firing; check Q-1, Q-2, CR-1 & associated circuitry.
	31	Instrument Scans		11430-300	PD has been reset; check associated circuitry to determine what is resetting PD. CR-44 defective.
33	38	Print Command Issued		11430-300	Same as 30; also check CR-43 & associated circuitry. Check for C pulse at pin 1; if absent, check wiring thru print-power switch, S-104.
	35			11 (4) (5) 30-100	Check wiring thru print-power switch, S-104.
39		No Scan in One or More Modes		11430-860	Check Q-1 & Q-2 and associated circuitry.
				11 (4) (5) 30-100	Check wiring thru mode switch, S-103.

- NOTES: 1. If there is a failure at any test no., check to see that the indicated dummy amplifier error produces the correct error signal at J-103, namely: for + Pol; $U = (+) + (0)$, $\bar{U} \bar{D} = (+) + (0)$ and $(+) + (0)$, $\bar{U} \bar{D} = (+) + (0)$ and $D = (-)$. For - Pol; $U = (-)$, $\bar{U} \bar{D} = (+) + (0)$ and $D = (+)$ and $(+) + (0)$.
2. Instructions for any specific test no. assume that all previous tests were OK.
3. If Test No's. are omitted, the test has been performed previously, as: steps 15 thru 22 confirm the results of previous steps.
4. The term "Associated Circuitry" means components, etched circuits, connectors and chassis wiring; probability of trouble area is in the order listed.
5. Symptoms, probable area of trouble and instructions are the same for step no's. in 9 and step no's. in 3 on the same line.

Figure 21. Troubleshooting with Dummy Amplifier.



NOTES: 1. TABLE BELOW SHOWS SYMBOLS USED FOR PLUG-IN AND MATING MAIN BOARD CONNECTORS.

SYMBOL	MAIN BD CONN.	PLUG-IN BOARD B EXPLANATION	
	J 102	"A" BOARD,	11430-200
	J 107	AMPLIFIER,	11420-600
	J 103	"B" BOARD,	11430-300
	J 121	TRIGGER CONTROL,	11430-861
	J 117	PRINT,	

2. $\rightarrow$ — INDICATES DIRECTION OF INFORMATION FLOW
3. ——— INDICATES CHASSIS WIRING.
4. PARTS DESIGNATIONS (R, C, R) ARE OMITTED. PART NO'S. ARE SHOWN TO AID IN CORRELATION WITH SCHEMATICS AND ASSEMBLY DRAWINGS.
5. C-14 IS THE PRINT FEEDBACK TRIGGER CAPACITOR. IT HAS NOTHING TO DO WITH THE TIMING CIRCUITS.
6. UNLESS OTHERWISE SPECIFIED ALL CAPACITORS ARE .02 μ .

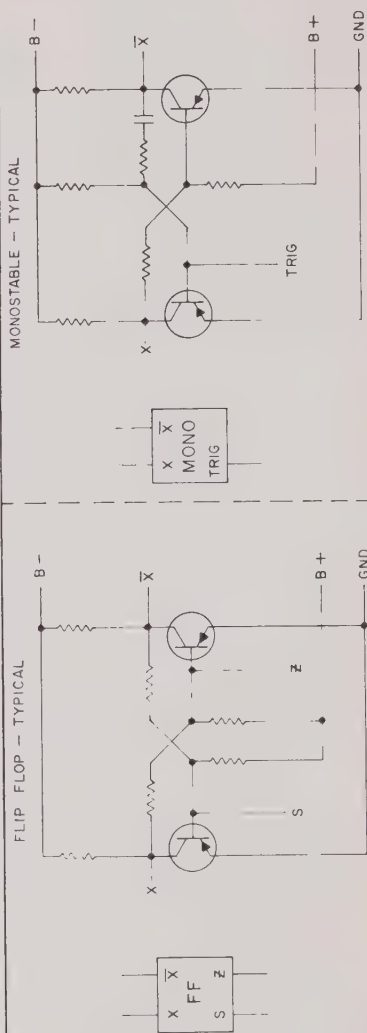


Figure 22. Simplified Schematic & Logic Diagram: Timing Circuits.

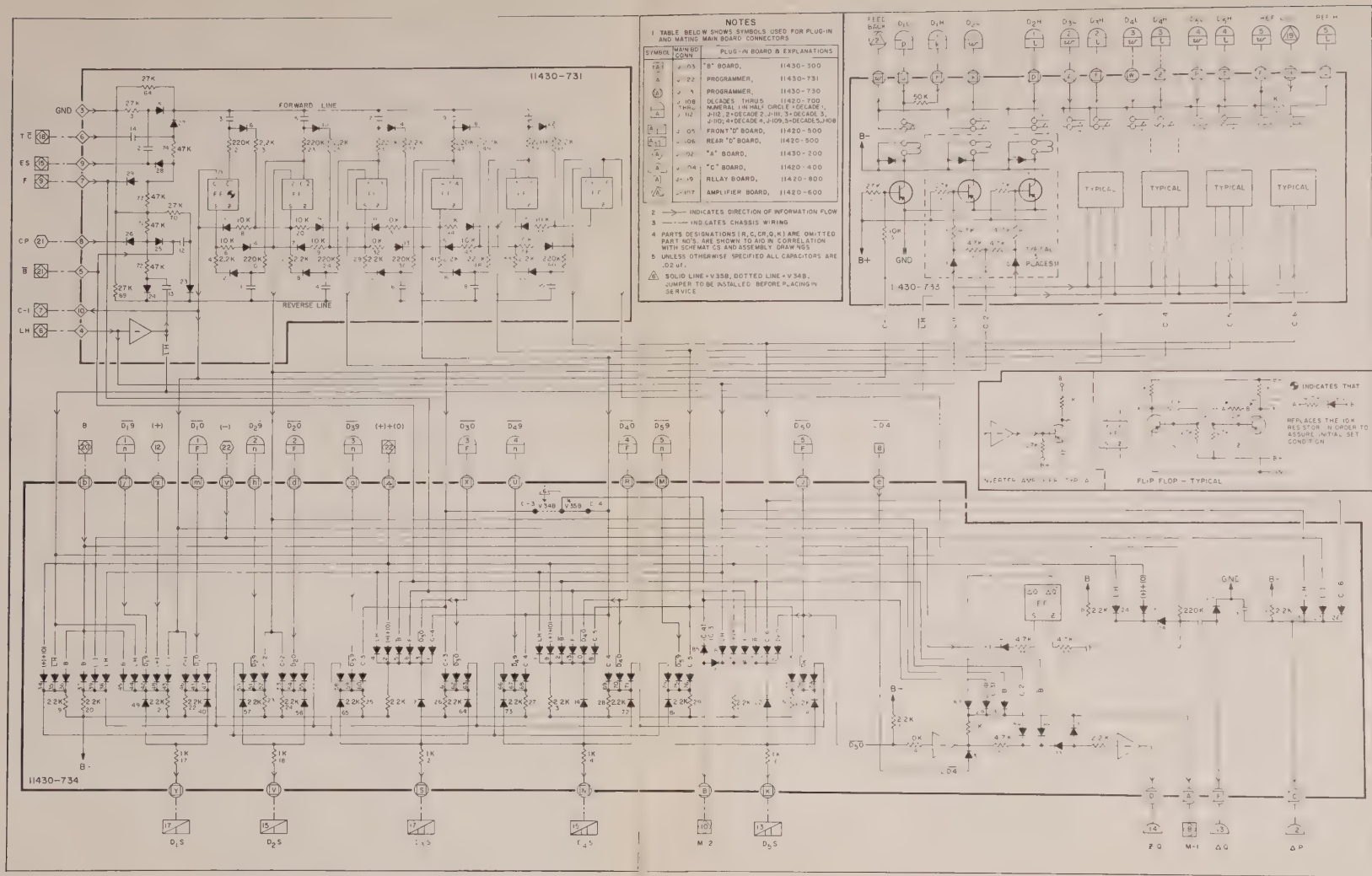
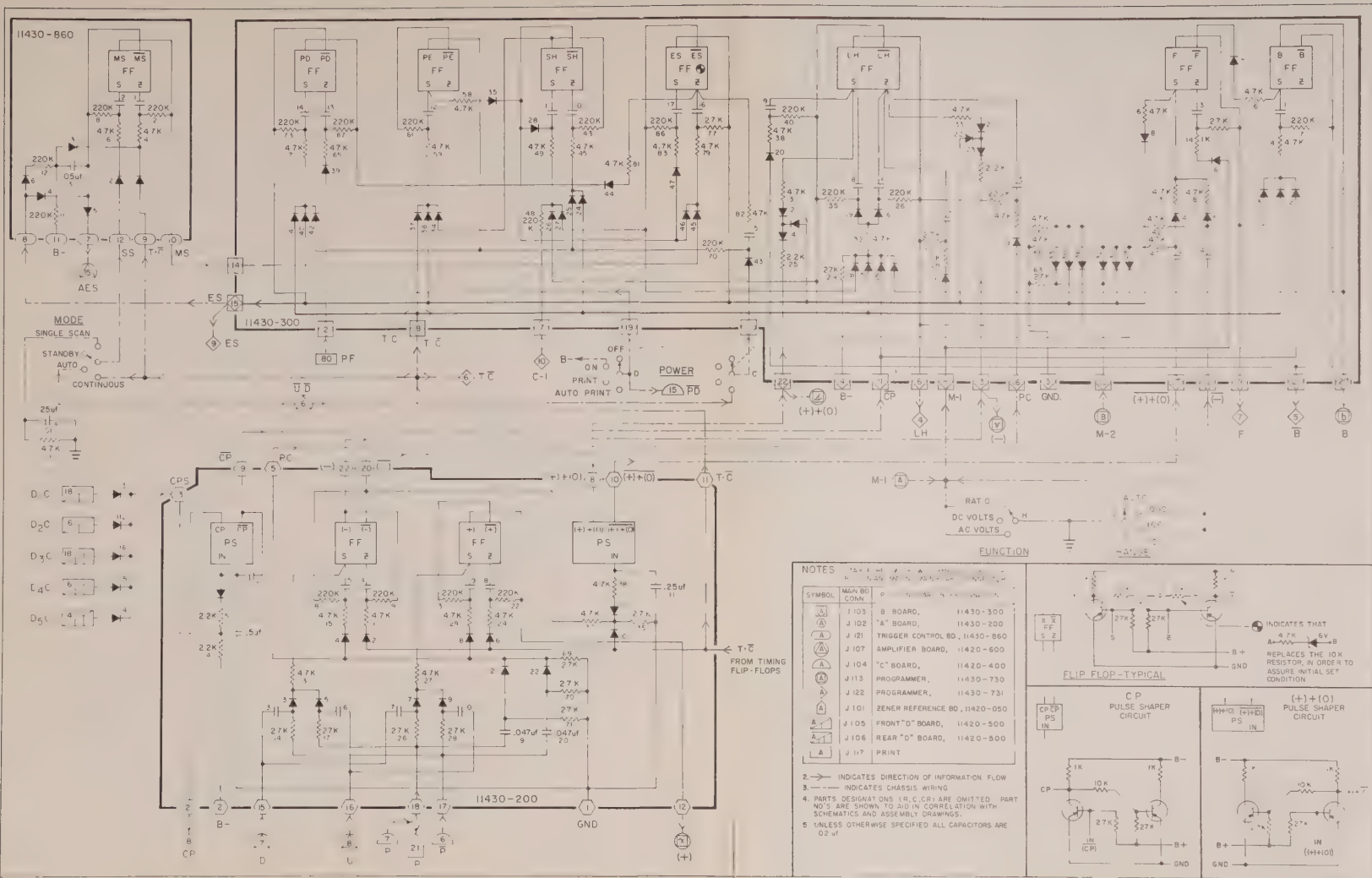


Figure 23. Simplified Schematic & Logic Diagram: Programmer.

Figure 24. Simplified Schematic & Logic Diagram: Programmer Commands.



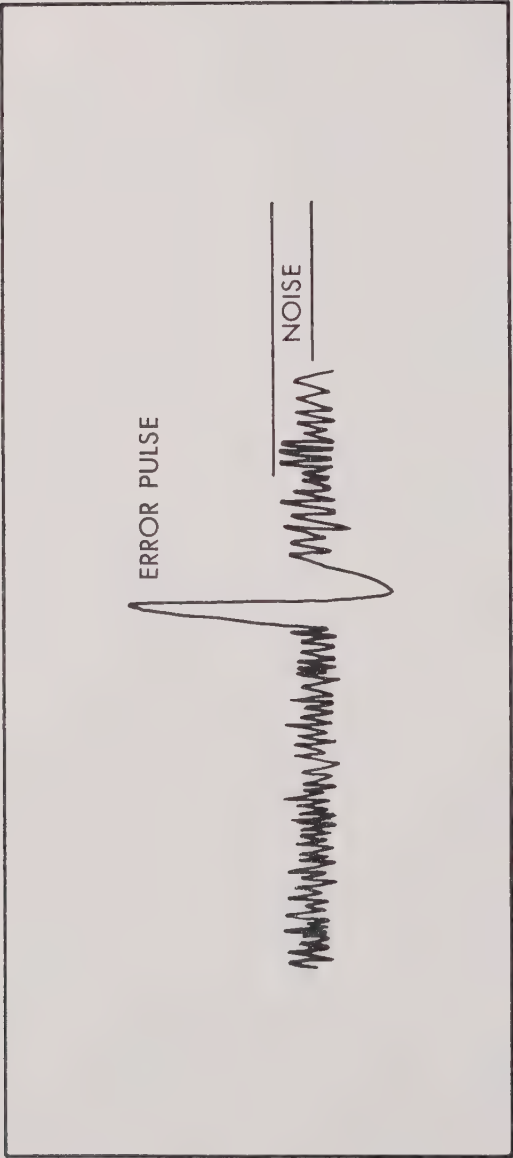


Figure 25. Error Amplifier Output Wave Form.

VOLTS*	JUMPERS	VOLTS*	JUMPERS	VOLTS*	JUMPERS	VOLTS*	JUMPERS
12.631-619	—	12.312-300	6-7	11.993-981	7-8	11.675-663	6-8
.621-609	1-2	.302-280	6-7, 1-2	.983-971	7-8, 1-2	.665-653	6-8, 1-2
.611-599	2-3	.292-280	6-7, 2-3	.973-961	7-8, 2-3	.655-643	6-8, 2-3
.601-589	1-3	.282-270	6-7, 1-3	.963-951	7-8, 1-3	.645-633	6-8, 1-3
.591-579	3-4	.272-260	6-7, 3-4	.953-941	7-8, 3-4	.635-623	6-8, 3-4
.581-569	3-4, 1-2	.262-250	6-7, 1-2, 3-4	.943-931	7-8, 3-4, 1-2	.625-613	6-8, 3-4, 1-2
.571-559	2-4	.252-240	6-7, 2-4	.933-921	7-8, 2-4	.615-603	6-8, 2-4
.561-549	1-4	.242-230	6-7, 1-4	.923-911	7-8, 1-4	.605-593	6-8, 1-4
.552-540	4-5	.232-220	6-7, 4-5	.914-902	7-8, 4-5	.595-583	6-8, 4-5
.542-530	4-5, 1-2	.222-210	6-7, 4-5, 1-2	.904-892	7-8, 4-5, 1-2	.585-573	6-8, 4-5, 1-2
.532-520	4-5, 2-3	.213-201	6-7, 4-5, 2-3	.894-882	7-8, 4-5, 2-3	.575-563	6-8, 4-5, 2-3
.522-510	4-5, 1-3	.203-191	6-7, 4-5, 1-3	.884-872	7-8, 4-5, 1-3	.565-553	6-8, 4-5, 1-3
.512-500	3-5	.193-181	6-7, 3-5	.874-862	7-8, 3-5	.555-543	6-8, 3-5
.502-490	3-5, 1-2	.183-171	6-7, 3-5, 1-2	.864-852	7-8, 3-5, 1-2	.545-533	6-8, 3-5, 1-2
.492-480	2-5	.173-161	6-7, 2-5	.854-842	7-8, 2-5	.535-523	6-8, 2-5
.482-470	1-5	.163-151	6-7, 1-5	.844-832	7-8, 1-5	.525-513	6-8, 1-5
.472-460	5-6	.153-141	5-7	.834-822	7-8, 5-6	.516-504	5-8
.462-450	5-6, 1-2	.143-131	5-7, 1-2	.824-812	7-8, 5-6, 1-2	.506-494	5-8, 1-2
.452-440	5-6, 2-3	.133-121	5-7, 2-3	.814-802	7-8, 5-6, 2-3	.496-484	5-8, 2-3
.442-430	5-6, 1-3	.123-111	5-7, 1-3	.804-792	7-8, 5-6, 1-3	.486-474	5-8, 1-3
.432-420	5-6, 3-4	.113-101	5-7, 3-4	.794-782	7-8, 5-6, 3-4	.476-464	5-8, 3-4
.422-410	5-6, 3-4, 1-2	.103-091	5-7, 3-4, 1-2	.784-772	7-8, 5-6, 3-4, 1-2	.466-454	5-8, 3-4, 1-2
.412-400	5-6, 2-4	.093-081	5-7, 2-4	.774-762	7-8, 5-6, 2-4	.456-444	5-8, 2-4
.402-390	5-6, 1-4	.083-071	5-7, 1-4	.764-752	7-8, 5-6, 1-4	.446-434	5-8, 1-4
.392-380	4-6	.073-061	4-7	.754-742	7-8, 4-6	.436-424	4-8
.382-370	4-6, 1-2	.063-051	4-7, 1-2	.745-733	7-8, 4-6, 1-2	.426-414	4-8, 1-2
.372-360	4-6, 2-3	.053-041	4-7, 2-3	.735-723	7-8, 4-6, 2-3	.416-404	4-8, 2-3
.362-350	4-6, 1-3	.043-031	4-7, 1-3	.725-713	7-8, 4-6, 1-3	.406-394	4-8, 1-3
.352-340	3-6	.033-021	3-7	.715-703	7-8, 3-6	.396-384	3-8
.342-330	3-6, 1-2	.023-011	3-7, 1-2	.705-693	7-8, 3-6, 1-2	.386-374	3-8, 1-2
.332-320	2-6	.013-001	2-7	.695-683	7-8, 2-6	.376-364	2-8
.322-310	1-6	12.003-11.991	1-7	.685-673	7-8, 1-6	.366-354	1-8

*MEASURED BETWEEN PINS 6 & 5 OF P-802 (ZENER REF. ASSY), WITH NO JUMPERS INSTALLED.

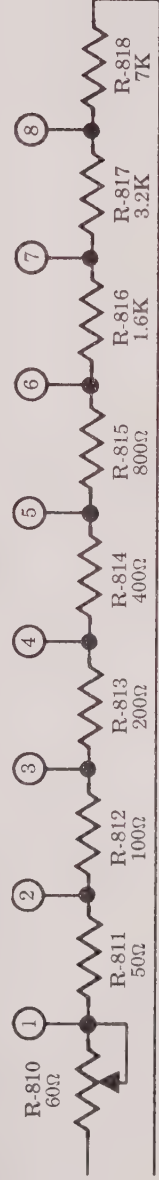
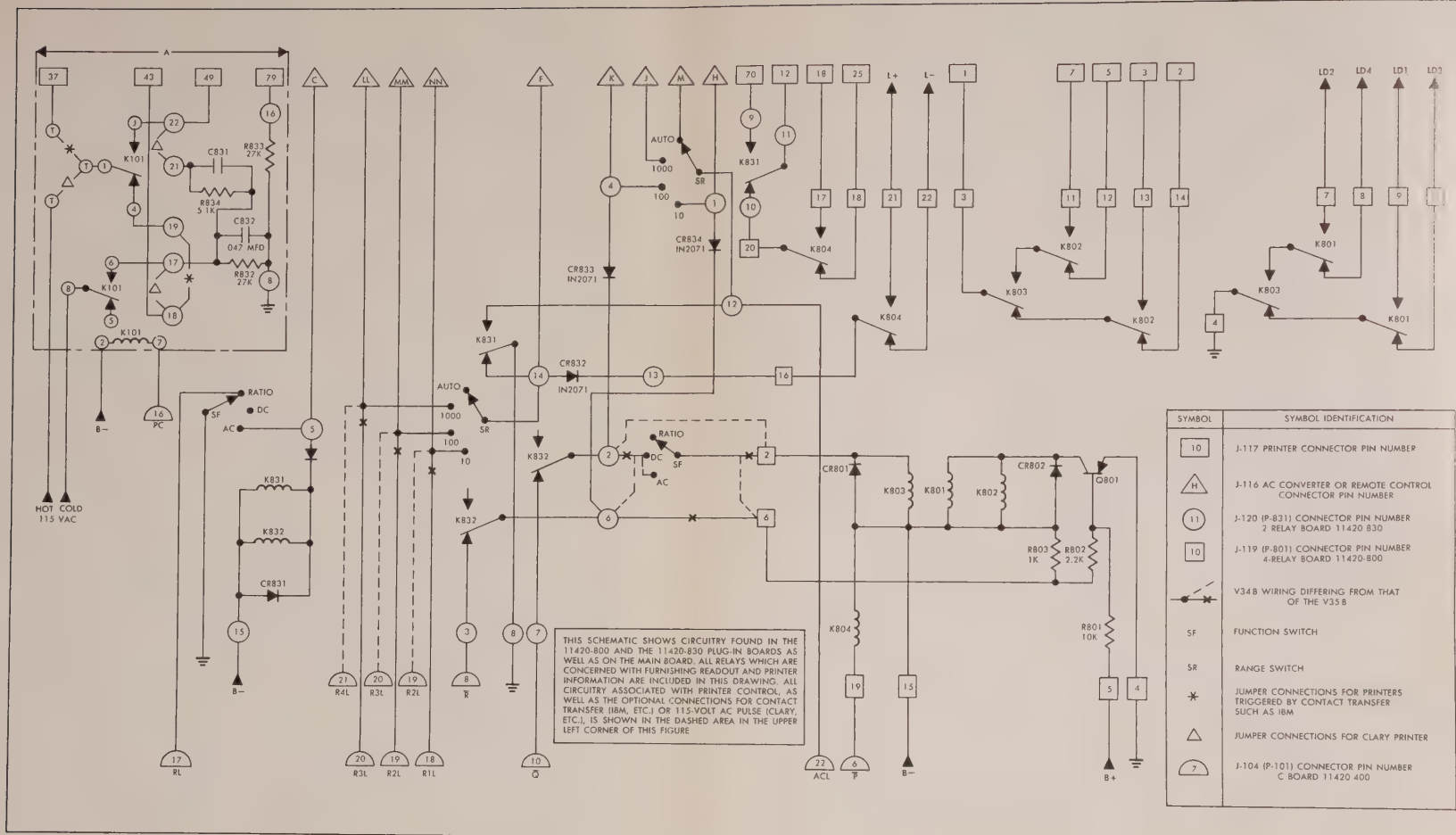


Figure 26. Jumper Connections for 10-Volt Calibrate Resistors.



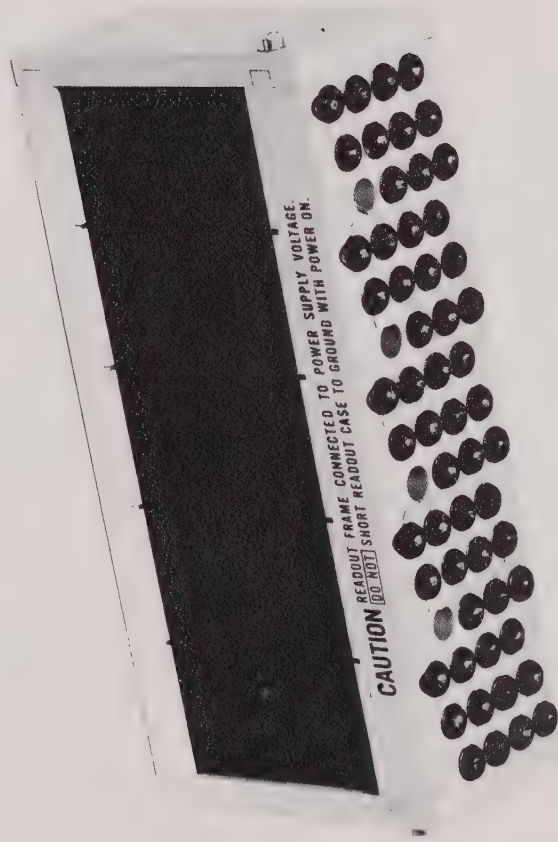


Figure 28. Front View of Readout (without visor) Showing Lamps Correctly Installed.

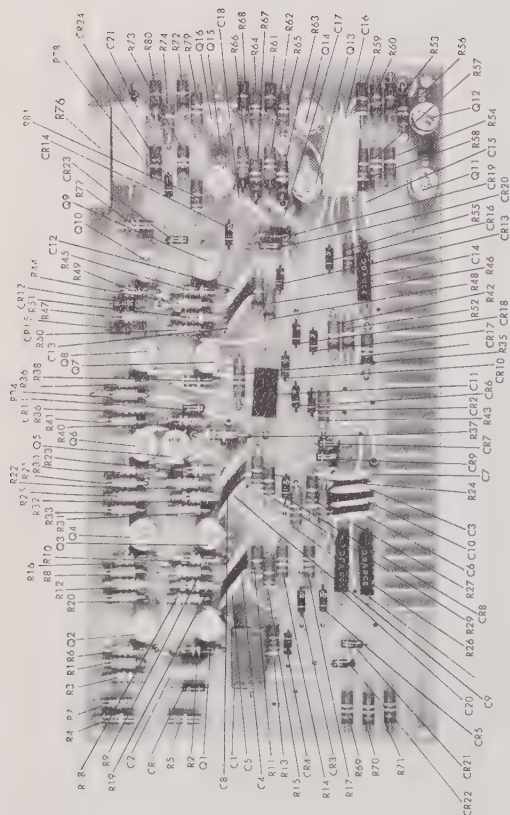
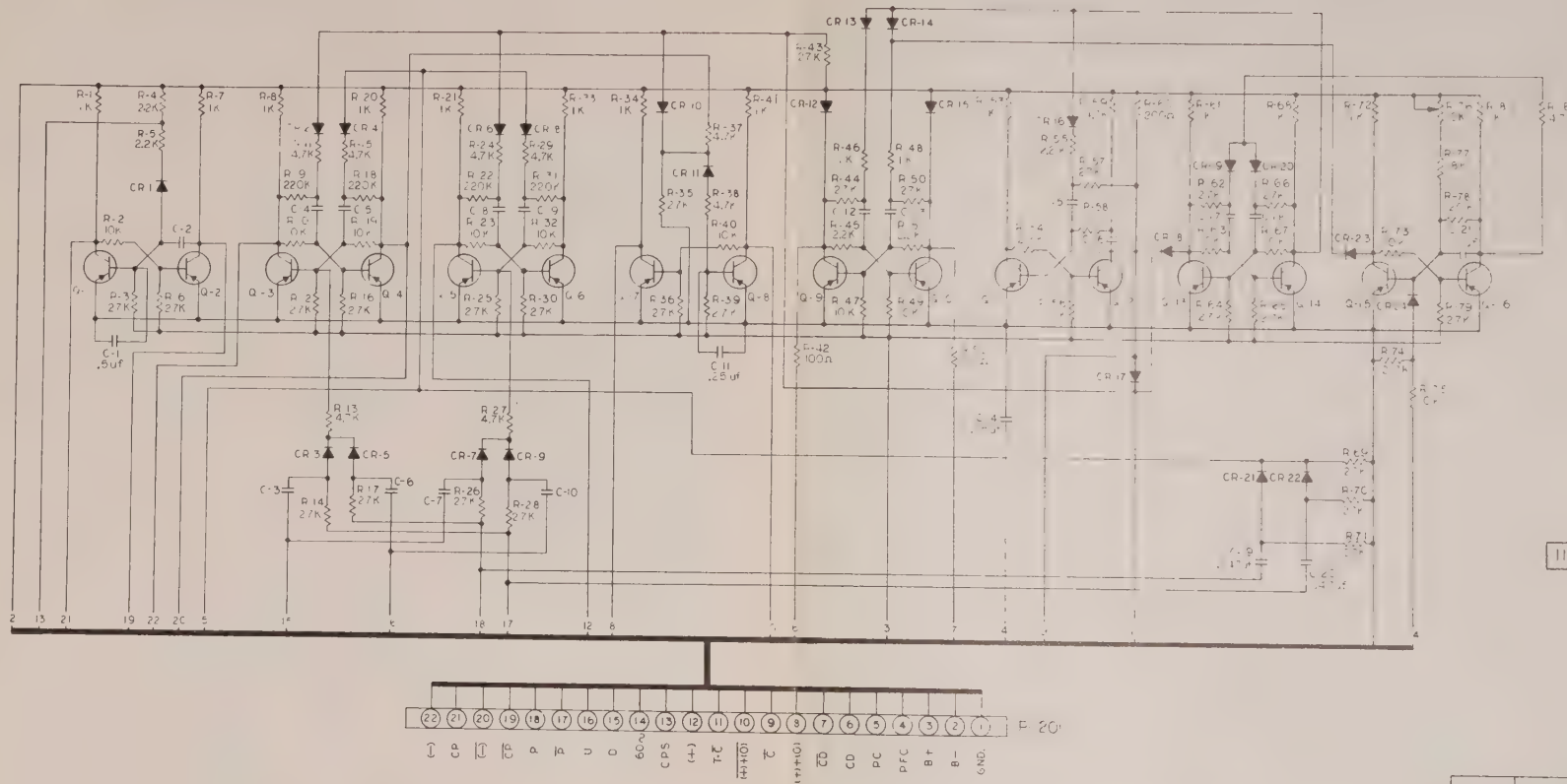


Figure 29. A Board.

CIRCUIT REFERENCE	PART NUMBER	DESCRIPTION	QTY PER UNIT	MANUFACTURER
C2-C10, 12, 13, 15, 17, 18	BT.02	CAPACITOR, .02 Mfd., $\pm 20\%$	14	RMC
C14, 19, 20	ME2-473E	CAPACITOR, Metalized Paper, .047 Mfd., 200 VDC	3	Electron
C11	ME1-254E	CAPACITOR, Metalized Paper, .25 Mfd., 100 VDC	1	Electron
C1	ME1-504E	CAPACITOR, Metalized Paper, .5 Mfd., 100 VDC	1	Electron
C16, 21	ME1-105	CAPACITOR, Metalized Paper, 1 Mfd., 100 VDC	2	Electron
R76	275-1-103	POTENTIOMETER, 10K	1	Bourns
R9, 18, 22, 31	EB2241	RESISTOR, 220K, $\frac{1}{2} W$, 10%	4	Allen Bradley
R3, 6, 12, 14, 16, 17, 25, 26	EB2731	RESISTOR, 27K, $\frac{1}{2} W$, 10%	25	Allen Bradley
R28, 30, 35, 36, 39, 43, 44, 50				
R57, 62, 64, 65, 66, 69, 70, 71, 79				
R77				
R78	EB1831	RESISTOR, 18K, $\frac{1}{2} W$, 10%	1	Allen Bradley
R2, 10, 19, 23, 32, 40, 47, 49, 56,	EB1331	RESISTOR, 20K, $\frac{1}{2} W$, 10%	1	Allen Bradley
63, 67, 73, 75	EB1031	RESISTOR, 10K, $\frac{1}{2} W$, 10%	13	Allen Bradley
R11, 13, 15, 24, 27, 29, 37, 38,	EB4721	RESISTOR, 4.7K, $\frac{1}{2} W$, 10%	11	Allen Bradley
58, 59, 81				
R74	EB2721	RESISTOR, 2.7K, $\frac{1}{2} W$, 10%	1	Allen Bradley
R4, 5, 45, 51, 54, 55	EB2221	RESISTOR, 2.2K, $\frac{1}{2} W$, 10%	6	Allen Bradley
R1, 7, 8, 20, 21, 33, 34	EB1021	RESISTOR, 1K, $\frac{1}{2} W$, 10%	15	Allen Bradley
R41, 46, 48, 53, 61, 68, 72, 80				
R60	EB2015	RESISTOR, 200 Ohm, $\frac{1}{2} W$, 10%	1	Allen Bradley
R42, 52	EB1011	RESISTOR, 100 Ohm, $\frac{1}{2} W$, 10%	2	Allen Bradley
CR1-CR24	5003-002	DIODE	24	NLS
Q1-Q16	2N1374	TRANSISTOR	16	T.I.



11430-200

3. TRANSISTORS ARE TYPE 2N1374
 2. CAPACITORS ARE .02 uF
 1. ALL DIODES ARE NLS TYPE 5003-002

NOTES: UNLESS OTHERWISE SPECIFIED

UNLESS OTHERWISE SPECIFIED		REV. 1	DATE 11/1/67	TITLE
DESIGNED BY	CHECKED BY	APPROVED BY	DATE	11/1/67
PLANNING	DESIGN	ASSEMBLY	DATE	11/1/67
MATERIAL		PAGES		
APPLICATION		QTY. REQD.		
SCHEMATIC		A BOARD ASSY.		
V 34B / V 35B		11430-200		
SCALE		BY		
SHEET 2		OF 2		

NLS NON-LINEAR SYSTEMS INC.
 DEL MAR AIRPORT
 DEL MAR, CALIFORNIA

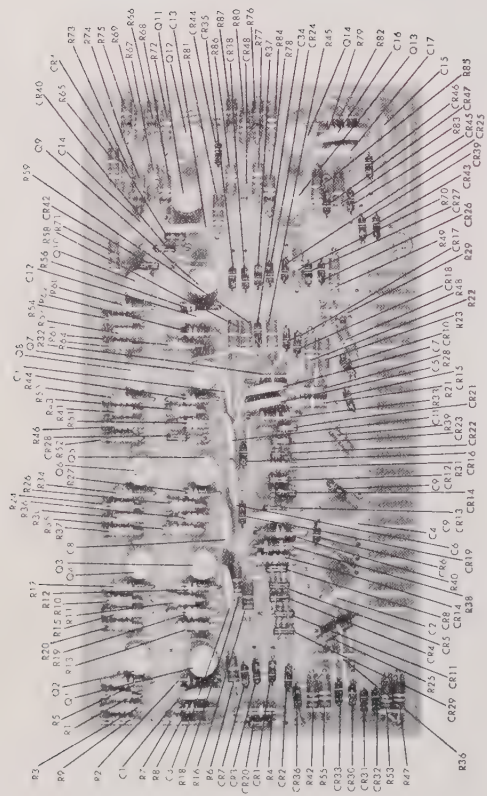


Figure 30. B Board.

CIRCUIT REFERENCE	PART NUMBER	DESCRIPTION	QTY PER UNIT	MANUFACTURER
C1-C17	BT.02	CAPACITOR, .02 Mfd., $\pm 20\%$	17	Radio Mat'ls. Co.
R7, 23, 26, 35, 40, 43, 48, 61, 67, 70, 73, 86	EB2241	RESISTOR, 220K, $\frac{1}{2}$ W, 10%	12	Allen Bradley
R42, 47, 53, 55	EB4731	RESISTOR, 47K, $\frac{1}{2}$ W, 10%	4	Allen Bradley
R3, 5, 11, 15, 17, 22, 29, 30, 34, 46, 50, 57, 60, 63, 69, 72, 80, 84, 77	EB2731	RESISTOR, 27K, $\frac{1}{2}$ W, 10%	19	Allen Bradley
R2, 8, 12, 19, 27, 36, 44, 51, 56, 62, 68, 74, 78	EB1031	RESISTOR, 10K, $\frac{1}{2}$ W, 10%	13	Allen Bradley
R4, 6, 13, 16, 18, 21, 32, 38, 45, 49, 58, 59, 65, 71, 79, 81, 82, 83, 85, 31, 33	EB4721	RESISTOR, 4.7K, $\frac{1}{2}$ W, 10%	21	Allen Bradley
R25, 39	EB2221	RESISTOR, 2.2K, $\frac{1}{2}$ W, 10%	2	Allen Bradley
R1, 9, 10, 20, 24, 37, 41, 52, 54, 64, 66, 75, 76, 87, 14, 28	EB1021	RESISTOR, 1K, $\frac{1}{2}$ W, 10%	16	Allen Bradley
CR48	$\frac{1}{4}$ M6.8Z	DIODE, Zener	1	Motorola
CR1-CR47	5003-002	DIODE	47	NLS
Q1-Q14	2N1374	TRANSISTOR	14	T.I.

DESCRIPTION

CIRCUIT REFERENCE	PART NUMBER	DESCRIPTION	QTY PER UNIT	MANUFACTURER
R16, R21	EB2241	RESISTOR, 220K, 1/2 W, 10%	2	Allen Bradley
R5, R25, R27, R31, R37, R42	EB2731	RESISTOR, 27K, 1/2 W, 10%	6	Allen Bradley
R3, R7, R9, R18, R28, R34, R39	EB1031	RESISTOR, 10K, 1/2 W, 10%	7	Allen Bradley
R2, R6, R8, R14, R19, R29, R33, R40	EB4721	RESISTOR, 4.7K, 1/2 W, 10%	8	Allen Bradley
R4, R10, R12, R13, R20, R30, R41	EB2221	RESISTOR, 2.2K, 1/2 W, 10%	7	Allen Bradley
R17, R26, R38	EB1521	RESISTOR, 1.5K, 1/2 W, 10%	3	Allen Bradley
R1, R11, R15, R22, R23, R24, R32, R35, R36	EB1021	RESISTOR, 1K, 1/2 W, 10%	9	Allen Bradley
C2	52RM25	CAPACITOR, Electrolytic, 25 Mfd. 25 VDC	1	Ind. Cond.
C1, C3, C4, C5, C8, C9, C10, C11	BT.02	CAPACITOR, .02 Mfd., ± 20 %, 100 VDC	8	RMC
C6, C7	DEZ 473E	CAPACITOR, Metalized Mylar, .047 Mfd., 200 VDC	2	Electron
CR1 thru CR32	5003-002	DIODE	32	NLS
Q1 thru Q11	2N1374	TRANSISTOR	11	T.I.

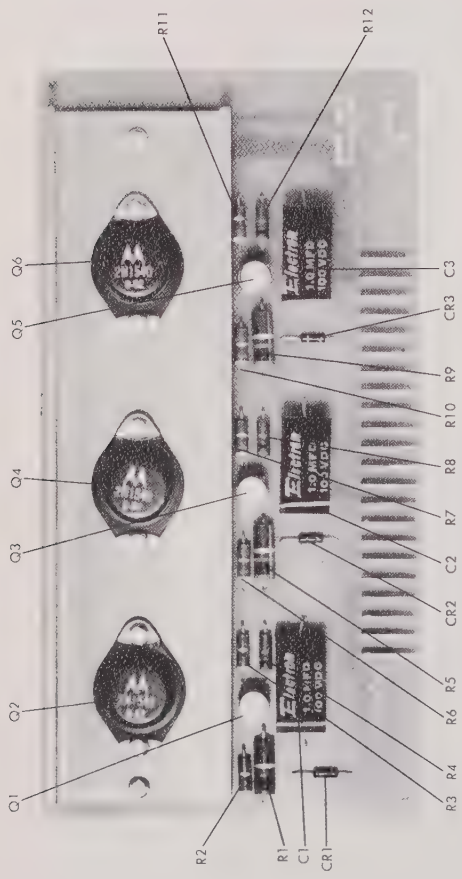
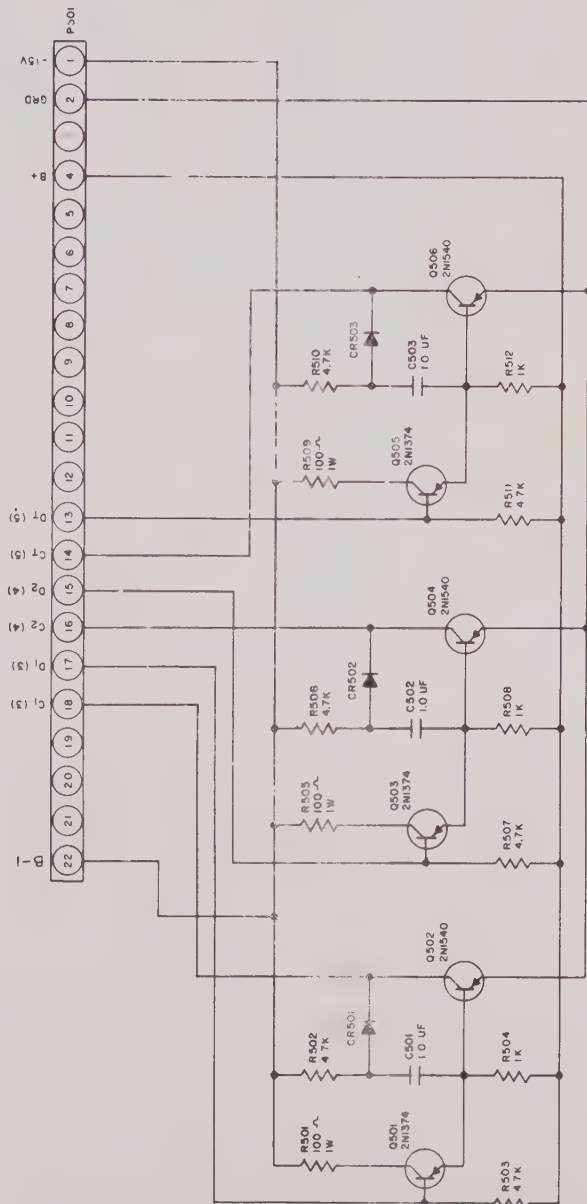


Figure 33. D Board (Instrument uses Two D Boards).

CIRCUIT REFERENCE	D BOARD	PART NUMBER	DESCRIPTION	QTY PER UNIT	MANUFACTURER
C1, C2, C3		ME1-105	CAPACITOR, Met. Paper, 1 Mfd., 100 VDC	3	Electron
R2, R3, R6, R7, R10, R11		EB4721	RESISTOR, 4.7K Ohm, 1/2 W, 10 %	6	Allen Bradley
R4, R8, R12		EB1021	RESISTOR, 1K Ohm, 1/2 W, 10 %	3	Allen Bradley
R1, R5, R9		GB1011	RESISTOR, 100 Ohm, 1 W, 10 %	3	Allen Bradley
CR1, CR2, CR3		5003-002	DIODE	3	NLS
Q2, Q4, Q6		2N1540	TRANSISTOR	3	Motorola
Q1, Q3, Q5		2N1374	TRANSISTOR	3	T.I.

REVISIONS			
NO.	DATE	DESCRIPTION	BY
1	1/14/62	Q1N 22 IS CONNECTED TO Q1N 1	Re
2	2/1/62	THIS BOARD IS CONNECTED TO Q1N 1	Re
3	2/1/62	THIS BOARD IS CONNECTED TO Q1N 1	Re
4	2/1/62	THIS BOARD IS CONNECTED TO Q1N 1	Re
5	2/1/62	THIS BOARD IS CONNECTED TO Q1N 1	Re
6	2/1/62	THIS BOARD IS CONNECTED TO Q1N 1	Re
7	2/1/62	THIS BOARD IS CONNECTED TO Q1N 1	Re
8	2/1/62	THIS BOARD IS CONNECTED TO Q1N 1	Re
9	2/1/62	THIS BOARD IS CONNECTED TO Q1N 1	Re
10	2/1/62	THIS BOARD IS CONNECTED TO Q1N 1	Re
11	2/1/62	THIS BOARD IS CONNECTED TO Q1N 1	Re
12	2/1/62	THIS BOARD IS CONNECTED TO Q1N 1	Re
13	2/1/62	THIS BOARD IS CONNECTED TO Q1N 1	Re
14	2/1/62	THIS BOARD IS CONNECTED TO Q1N 1	Re
15	2/1/62	THIS BOARD IS CONNECTED TO Q1N 1	Re
16	2/1/62	THIS BOARD IS CONNECTED TO Q1N 1	Re
17	2/1/62	THIS BOARD IS CONNECTED TO Q1N 1	Re
18	2/1/62	THIS BOARD IS CONNECTED TO Q1N 1	Re
19	2/1/62	THIS BOARD IS CONNECTED TO Q1N 1	Re
20	2/1/62	THIS BOARD IS CONNECTED TO Q1N 1	Re
21	2/1/62	THIS BOARD IS CONNECTED TO Q1N 1	Re
22	2/1/62	THIS BOARD IS CONNECTED TO Q1N 1	Re



1. DIODES ARE NLS NO 5003-002.
NOTES-UNLESS OTHERWISE SPECIFIED:-

DATE	1/14/62	BY	Re
APPROVED		DATE	1/14/62
TITLE			
D11 BOARD ASSEMBLY SCHEMATIC			
MODEL V34A & V35A			
11420-500			
NON-LINEAR SYSTEMS INC			
DR. MAX ABROTT			
OIL, SAN FRANCISCO			
11420-500			
1			

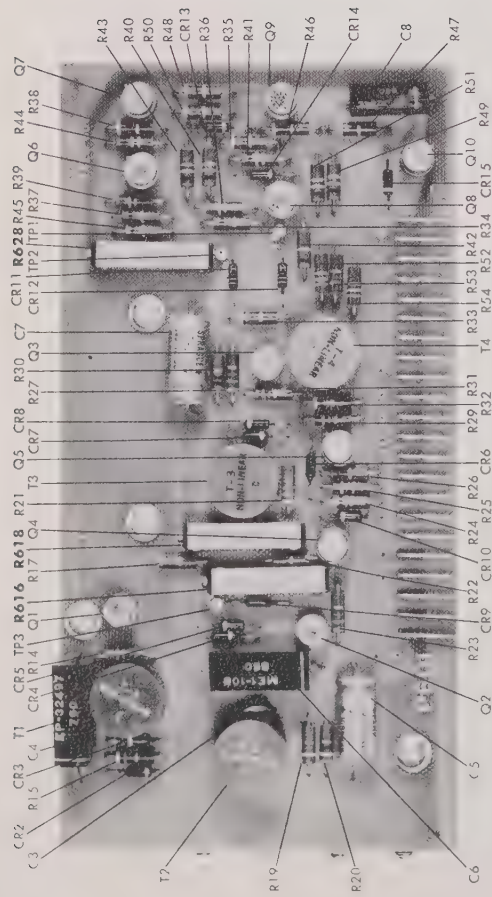


Figure 34. Amplifier, Front View.

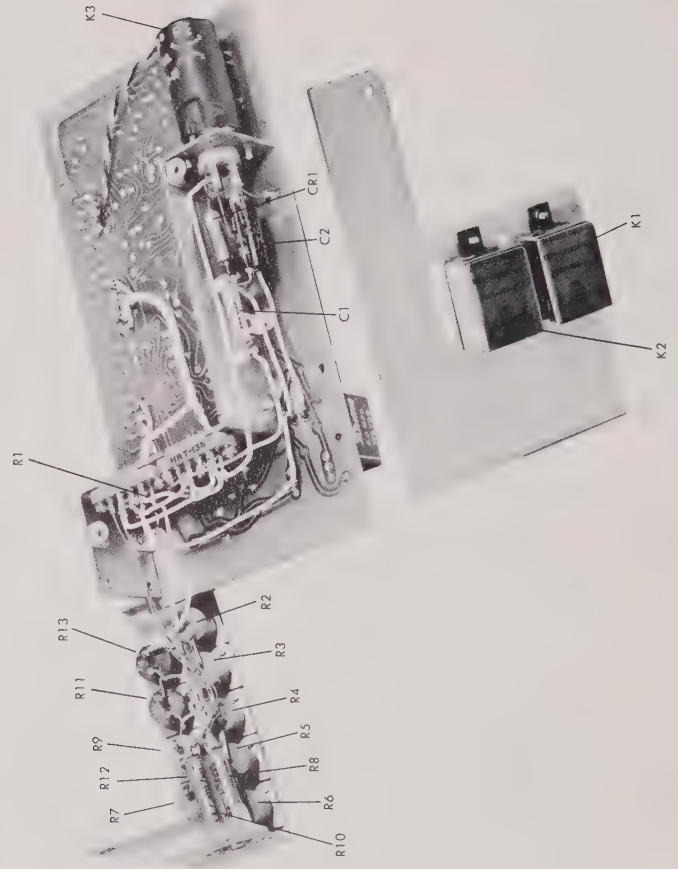
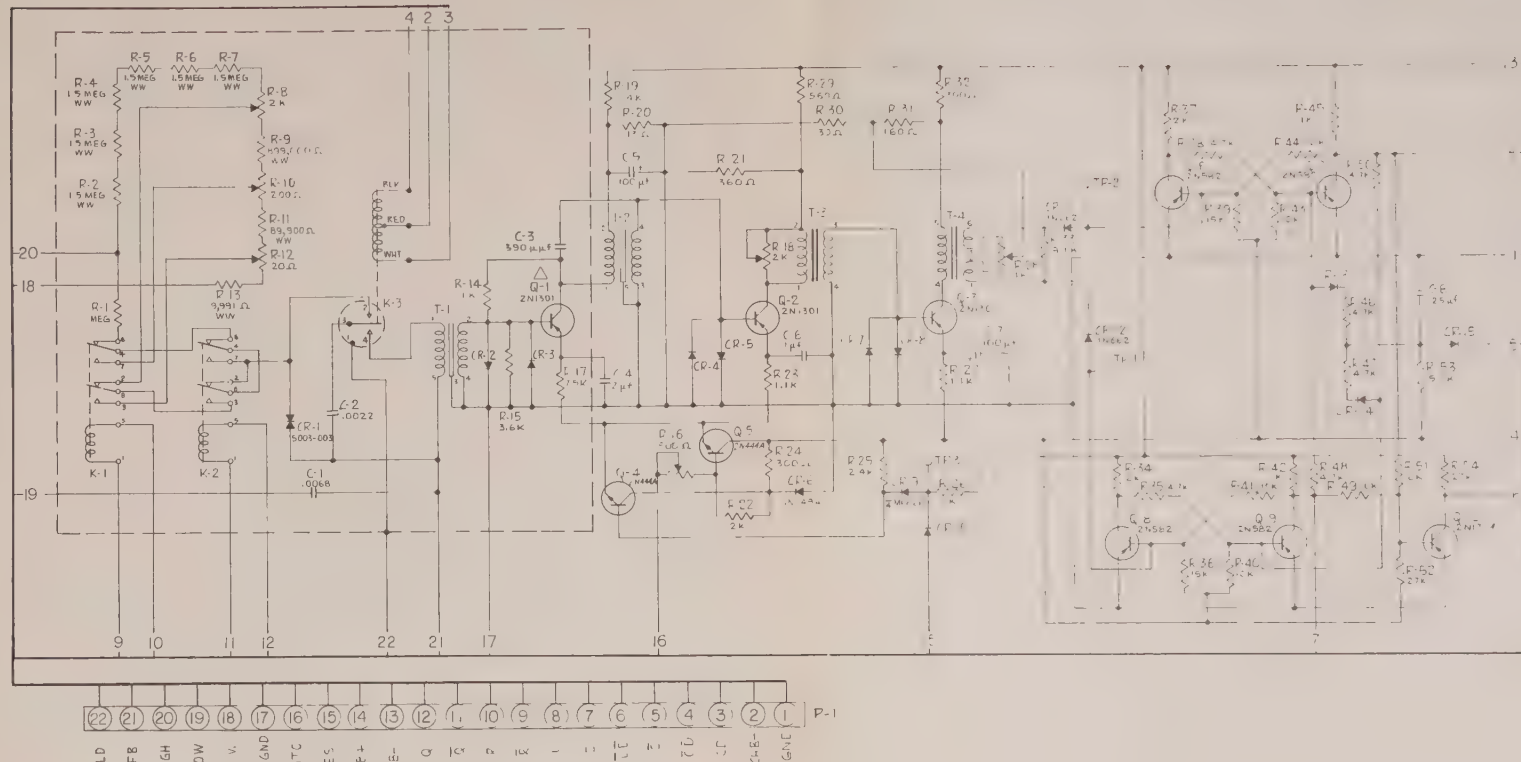


Figure 35. Amplifier, Rear View (partially disassembled).

REVISIONS		
REV	APPROV	DESCRIPTION
1	ALL	REVISED FROM 11420-600 TO 11420-600-01
2	ALL	REVISED FROM 11420-600-01 TO 11420-600-02



Δ SELECTED FOR LOW NOISE.

3. ALL COMPONENT REF. NUMBERS ARE IN THE 600 SERIES; i.e. R-1 - R-601

2. DIODES ARE TYPE 5003-002.

1. CAPACITOR VALUE IS IN MICROFARADS.

NOTES: UNLESS OTHERWISE SPECIFIED.

SCHEMATIC- AMPLIFIER BD. ASSEM.		NON-LINEAR SYSTEMS INC. DEL. MAR. AIRPORT DEL. MAR. CA 94024
V34A V35A DIGITAL VOLTMETER		
DRAWING NUMBER 11420-600	SCALE 1:1	DATE 11/20/60

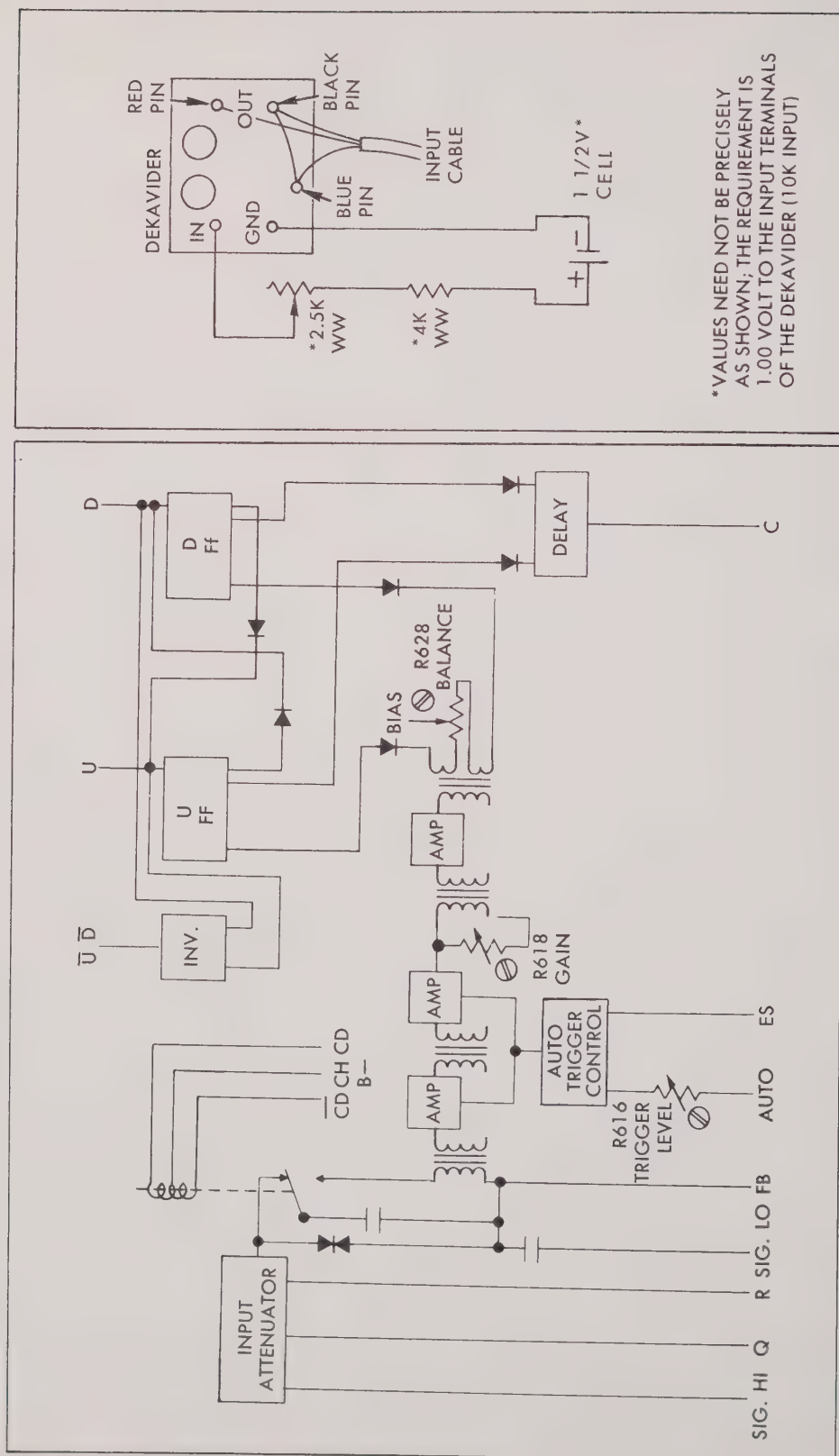


Figure 36. Amplifier Block Diagram and Voltage Source for Test.

CIRCUIT REFERENCE	PART NUMBER	DESCRIPTION	QTY PER UNIT	MANUFACTURER
T1	11420-607	TRANSFORMER, Isolation	1	NLS
T2	11420-608	TRANSFORMER, Input	1	NLS
T3	11420-609	TRANSFORMER, Interstage	1	NLS
T4	11420-610	TRANSFORMER, Output	1	NLS
Q1, 2, 3	2N1301	TRANSISTOR	3	RCA
Q6, 7, 8, 9	2N582	TRANSISTOR	4	RCA
Q10	2N1374	TRANSISTOR	1	TI
Q4, 5	2N444A	TRANSISTOR	2	GT
CR11, 12	1N662	DIODE	2	Transitron
CR2-5, 7, 8, 10, 13, 14, 15	5003-002	DIODE	10	NLS
CR6	1N749A	DIODE	1	TI
CR9	1/4M6.8Z10	DIODE	1	Motorola
C5, 7	TE 1135	CAPACITOR, Electrolytic, 100 Mfd, 12 VDCW	2	Sprague
C4	5002-001	CAPACITOR	1	NLS
C6	ME1-105	CAPACITOR, Metalized Paper, 1 Mfd, 100 VDCW	1	Electron
C8	ME1-254E	CAPACITOR, Metalized Paper, .25 Mfd, 10%, 100 VDCW	1	Electron
C3	DD391	CAPACITOR, Ceramic, 390 Mfd, 10%, 1000 VDCW	1	Centralab
R28	275-1-501	POTENTIOMETER, 500 Ohm	1	Bourns
R16	275-1-102	POTENTIOMETER, 1 K Ohm	1	Bourns
R18	275-1-202	POTENTIOMETER, 2 K Ohm	1	Bourns
R31	EB 1615	RESISTOR, 160 Ohm, 1/2 W, 5%	1	Allen Bradley
R24, 32	EB 3015	RESISTOR, 300 Ohm, 1/2 W, 5%	1	Allen Bradley
R21	EB 5615	RESISTOR, 360 Ohm, 1/2 W, 5%	2	Allen Bradley
R29	EB 3615	RESISTOR, 560 Ohm, 1/2 W, 5%	1	Allen Bradley
R26, 42, 45	EB 1021	RESISTOR, 1 K Ohm, 1/2 W, 10%	1	Allen Bradley
R23, 27	EB 1125	RESISTOR, 1.1 K Ohm, 1/2 W, 5%	3	Allen Bradley
R22, 34, 37	EB 2025	RESISTOR, 2 K Ohm, 1/2 W, 5%	2	Allen Bradley
R19, 25	EB 2425	RESISTOR, 2.4 K Ohm, 1/2 W, 5%	3	Allen Bradley
R15	EB 3625	RESISTOR, 3.6 K Ohm, 1/2 W, 5%	2	Allen Bradley
R35, 38, 46, 47, 48, 50	EB 4721	RESISTOR, 4.7 K Ohm, 1/2 W, 10%	1	Allen Bradley
R53	EB 5125	RESISTOR, 5.1 K Ohm, 1/2 W, 5%	6	Allen Bradley
R17	EB 7525	RESISTOR, 7.5 K Ohm, 1/2 W, 5%	1	Allen Bradley
R33	EB 9125	RESISTOR, 9.1 K Ohm, 1/2 W, 5%	1	Allen Bradley
R40, 41, 43, 44, 49, 51	EB 1031	RESISTOR, 10 K Ohm, 1/2 W, 10%	1	Allen Bradley
R36, 39	EB 1531	RESISTOR, 15 K Ohm, 1/2 W, 10%	6	Allen Bradley
R32, 54	EB 2731	RESISTOR, 27 K Ohm, 1/2 W, 10%	2	Allen Bradley
R14	EB 1135	RESISTOR, 11 K Ohm, 1/2 W, 5%	2	Allen Bradley
R20	EB 1305	RESISTOR, 13 Ohm, 1/2 W, 10%	1	Allen Bradley
R30	EB 3005	RESISTOR, 30 Ohm, 1/2 W, 5%	1	Allen Bradley
K3	C 1417-15	CHOPPER	1	Allen Bradley
CR1	5003-003	DIODE	1	Bristol
C1	XL2-682	CAPACITOR, Polystyrene, .0068 Mfd, 200 VDCW	1	NLS
C2	XL2-222	CAPACITOR, Polystyrene, .0022 Mfd, 200 VDCW	1	Electron
R12	025-OL-1-20	POTENTIOMETER, 20 Ohm	1	Electron
R10	025-OL-1-200	POTENTIOMETER, 200 Ohm	1	Conelco
R8	025-OL-1-2K	POTENTIOMETER, 2 K Ohm	1	Conelco
R2-7	PW1719B-15003M	RESISTOR, 1.5 Meg, 1/2 W, .05%, Aqua	6	Conelco
R9	PW1719B-89902M	RESISTOR, 899 K Ohm, 1/2 W, .05%, Orange	1	NLS
R11	PW1719B-89901M	RESISTOR, 89.9 K Ohm, 1/2 W, .05%, Red	1	NLS
R13	PW1719B-99910M	RESISTOR, 9.9911 K Ohm, 1/2 W, .05%, Brown	1	NLS
R1	GB 1051	RESISTOR, 1 Meg, 1W, 10%	1	Allen Bradley
K1, 2	5005-003	RELAY	2	NLS

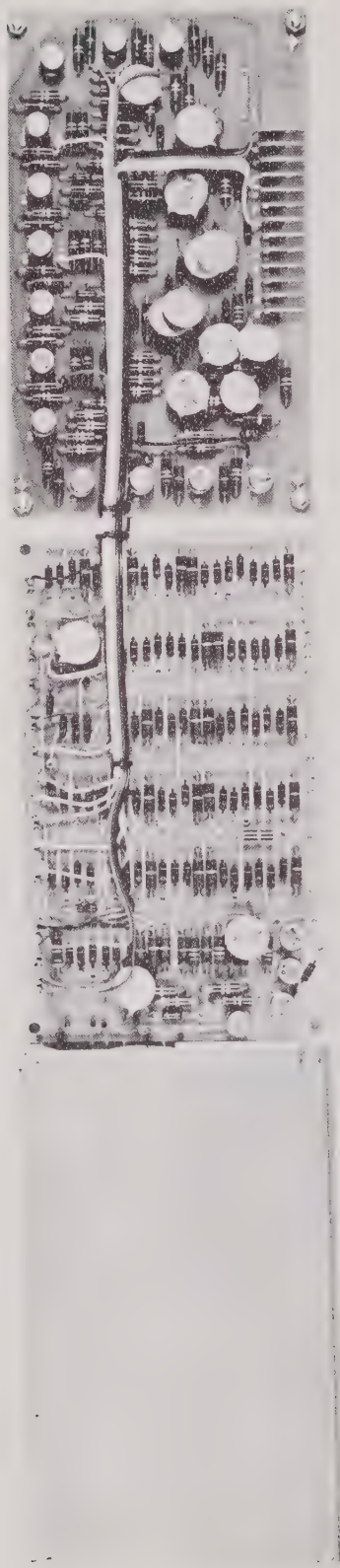
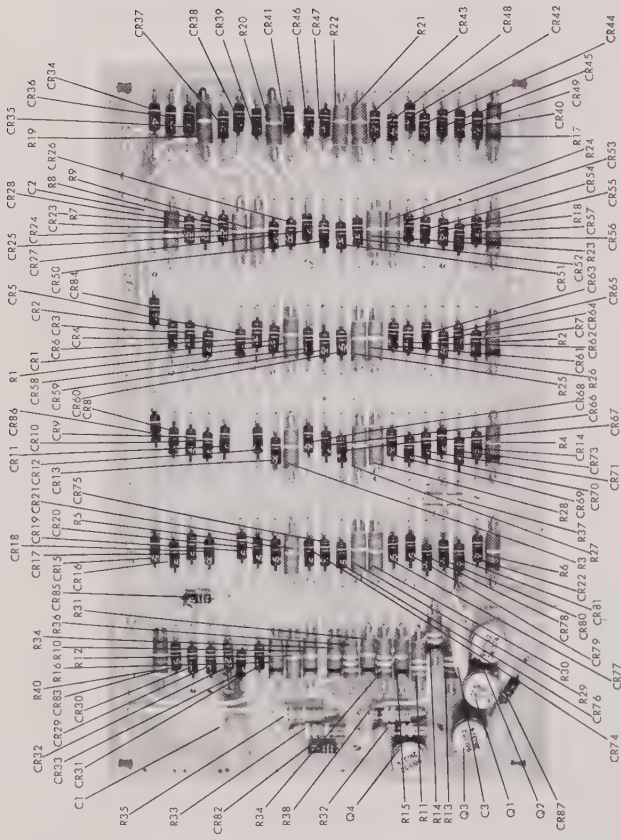


Figure 37. Programmer Assembly, Open View — Front (see Figures 39, 40, and 41 for parts identification).



Figure 38. Programmer, Assembly, Open View — Rear.



11430-734

MATRIX BOARD

Figure 40. Programmer, Matrix Board (harness removed).

CIRCUIT REFERENCE	PART NUMBER	DESCRIPTION	QTY PER UNIT	MANUFACTURER
C1-C3	BT.02	CAPACITOR, .02 Mfd., $\pm 20\%$	3	R.M.C.
R7	EB2241	RESISTOR, 220K, $\frac{1}{2}W$, 10%	1	Allen Bradley
R11, 13, 34, 36	EB2731	RESISTOR, 27K, $\frac{1}{2}W$, 10%	4	Allen Bradley
R14, 32, 38	EB1031	RESISTOR, 10K, $\frac{1}{2}W$, 10%	3	Allen Bradley
R33, 35, 40	EB4721	RESISTOR, 4.7K, $\frac{1}{2}W$, 10%	3	Allen Bradley
R1, 3, 5, 8, 9, 19-30, 37, 12	EB2221	RESISTOR, 2.2K, $\frac{1}{2}W$, 10%	19	Allen Bradley
R2, 4, 6, 10, 15, 16, 17, 18, 31, 39	EB1021	RESISTOR, 1K, $\frac{1}{2}W$, 10%	10	Allen Bradley
CR1-CR87	5003-002	DIODE	87	NLS
Q1-Q4	2N1374	TRANSISTOR	4	T.I.

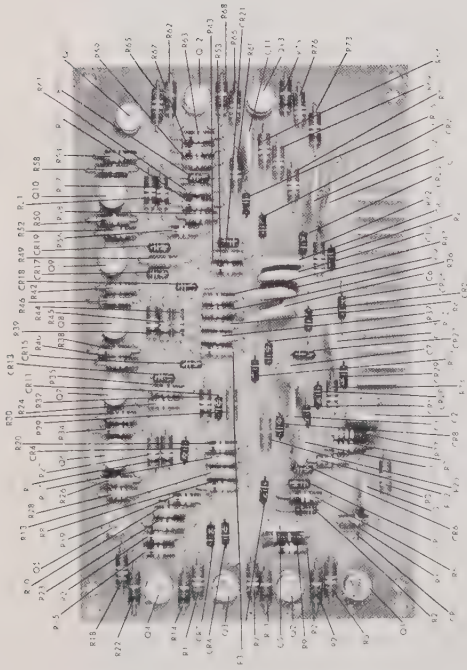


Figure 41. Programmer, Counter Board (harness removed).

11430-731 COUNTER BOARD		Figure 41. Programmer, Counter Board (harness removed).		
CIRCUIT REFERENCE	PART NUMBER	DESCRIPTION	QTY PER UNIT	MANUFACTURER
C1-C14	BT.02	CAPACITOR, .02 Mfd., $\pm 20\%$	14	Radio Mat'ls. Co.
R10, 12, 23, 24, 35, 36, 47, 48, 59, 60	EB2241	RESISTOR, 220K, $\frac{1}{2}W$, 10%	10	Allen Bradley
R71, 72, 77, 74	EB4731	RESISTOR, 47K, $\frac{1}{2}W$, 10%	4	Allen Bradley
R3, 5, 7, 16, 18, 28, 30, 40, 42, 52, 54, 64, 65, 66, 68, 70, 76	EB2731	RESISTOR, 27K, $\frac{1}{2}W$, 10%	17	Allen Bradley
R2, 6, 8, 15, 19, 20, 21, 27, 31, 32, 33, 39, 43, 44, 45, 51, 55, 56, 57, 63, 67, 73	EB1031	RESISTOR, 10K, $\frac{1}{2}W$, 10%	22	Allen Bradley
R9	EB4721	RESISTOR, 4.7K, $\frac{1}{2}W$, 10%	1	Allen Bradley
R4, 13, 17, 25, 29, 37, 41, 49, 53, 61	EB2221	RESISTOR, 2.2K, $\frac{1}{2}W$, 10%	10	Allen Bradley
R1, 11, 14, 22, 26, 34, 38, 46, 50, 58, 62, 68, 75	EB1021	RESISTOR, 1K, $\frac{1}{2}W$, 10%	13	Allen Bradley
CR3	$\frac{1}{4}M6.8Z$	DIODE, Zener	1	Motorola
CR1, 2, 4-29	5003-002	DIODE	28	NLS
Q1-Q13	2N1374	TRANSISTOR	13	T.I.

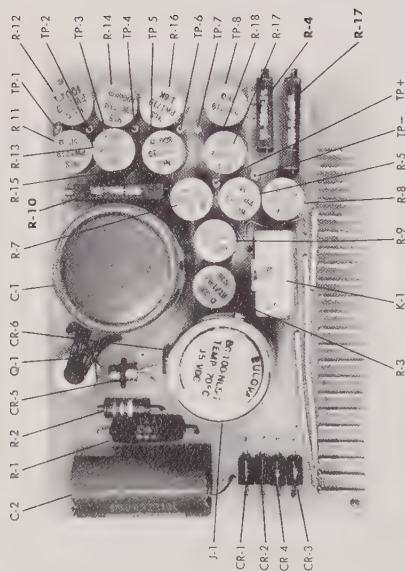
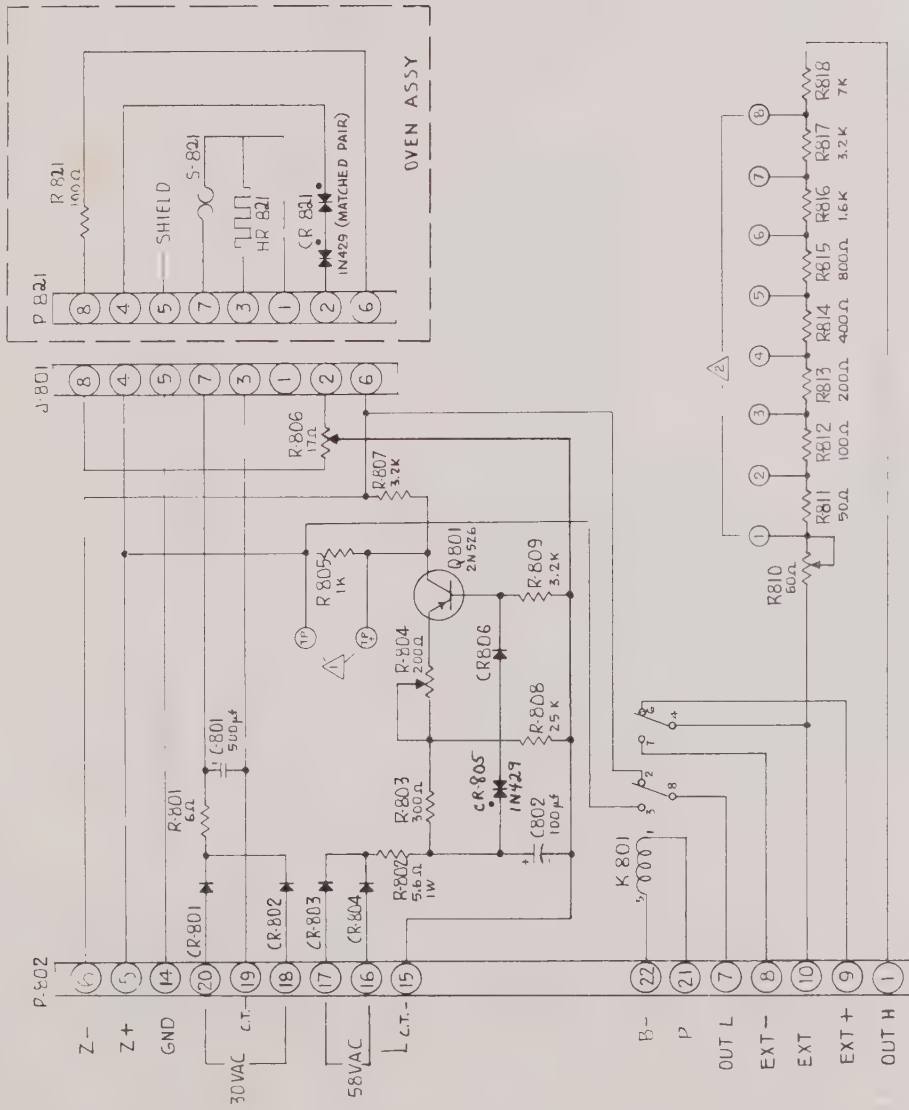


Figure 42. Zener Reference Voltage Supply Board.

CIRCUIT REFERENCE	PART NUMBER	DESCRIPTION	QTY PER UNIT	MANUFACTURER
K1	5005-003	RELAY	1	NLS
C2	05RM100	CAPACITOR, Elect., 100 Mfd., 50 VDCW	1	Ind. Cond.
C1	05RTP500	CAPACITOR, Elect., 500 Mfd., 50 VDCW	1	Ind. Cond.
R4	W5-P2-200	POTENTIOMETER, 200 Ohm, 10%	1	Atchm
R10	W101-P1-60	POTENTIOMETER, 60 Ohm, 10%	1	Atchm
R6	2420-17	POTENTIOMETER, 17 Ohm, 10%	1	Conelco
R8	PW1719	RESISTOR, 25K Ohm, 1/2 W, 1%	1	NLS
R18	PW1719	RESISTOR, 7K Ohm, 1/2 W, .05%	1	NLS
R17	PW1719	RESISTOR, 3.2K Ohm, 1/2 W, .05%	1	NLS
R7, R9	PW1719	RESISTOR, 3.2K Ohm, 1/2 W, .25%	2	NLS
R16	PW1719	RESISTOR, 1.6K Ohm, 1/2 W, .1%	1	NLS
R5	PW1719	RESISTOR, 1K Ohm, 1/2 W, .25%	1	NLS
R15	PW1719	RESISTOR, 800 Ohm, 1/2 W, .1%	1	NLS
R14	PW1719	RESISTOR, 400 Ohm, 1/2 W, .25%	1	NLS
R3	PW1719	RESISTOR, 300 Ohm, 1/2 W, .25%	1	NLS
R13	PW1719	RESISTOR, 200 Ohm, 1/2 W, .25%	1	NLS
R12	PW1719	RESISTOR, 100 Ohm, 1/2 W, .5%, 3/8" Leads	1	NLS
R11	PW1719	RESISTOR, 50 Ohm, 1/2 W, 1%	1	NLS
R2	GB56G1	RESISTOR, 5.6 Ohm, 1W, 10%	1	AB
R1	PRC 5A	RESISTOR, .6 Ohm, 5W, 1%	1	PRC
Q1	2N526	TRANSISTOR	1	G.E.
CR5	1N429	DIODE	1	Hoffman
CR1, 2, 3, 4, 6	1N2616	DIODE	5	Motorola
	11420-054	ZENER OVEN SUB-ASSY.	1	NLS

REVISIONS			
REV	DATE	DESCRIPTION	APPROVAL
1	7-25-67	INITIAL HATCHING DATE	J. A. VALLIN
2	8-1-67	CHG. OF RELAY	J. A. VALLIN
3	10-1-67		J. A. VALLIN



△ CERTAIN COMBINATIONS ARE SHORTED TO COMPENSATE FOR ZENER DIODE VOLTAGE (SEE MANUAL)

△ TP1 & TP2 ARE USED IN ADJUSTING THE ZENER REFERENCE

NOTES - UNLESS OTHERWISE SPECIFIED:

UNLESS OTHERWISE SPECIFIED		TOLERANCES ARE IN INCHES		TOLERANCES ON ANGLES		FINISH		SCALE		WT.	
FRACTION	DECIMAL	FRACTION	DECIMAL	FRACTION	DECIMAL	FRACTION	DECIMAL	FRACTION	DECIMAL	FRACTION	DECIMAL
TITLE				DRAWN BY				DATE			
ZENER SUPPLY ASSEMBLY				J. A. VALLIN				DATE			
S-100				APPROVED BY				DATE			
NON-LINEAR SYSTEMS INC.				DEL MAR AIRPORT				DRAWING NUMBER			
DEL MAR AIRPORT				V34A V3FA				11420-050			
SHEET 1 OF 2				APPLICATION				QTY REQD			
NEXT ASSY				USED ON				NEXT ASSY			
FINAL ASSY				QTY REQD				FINAL ASSY			

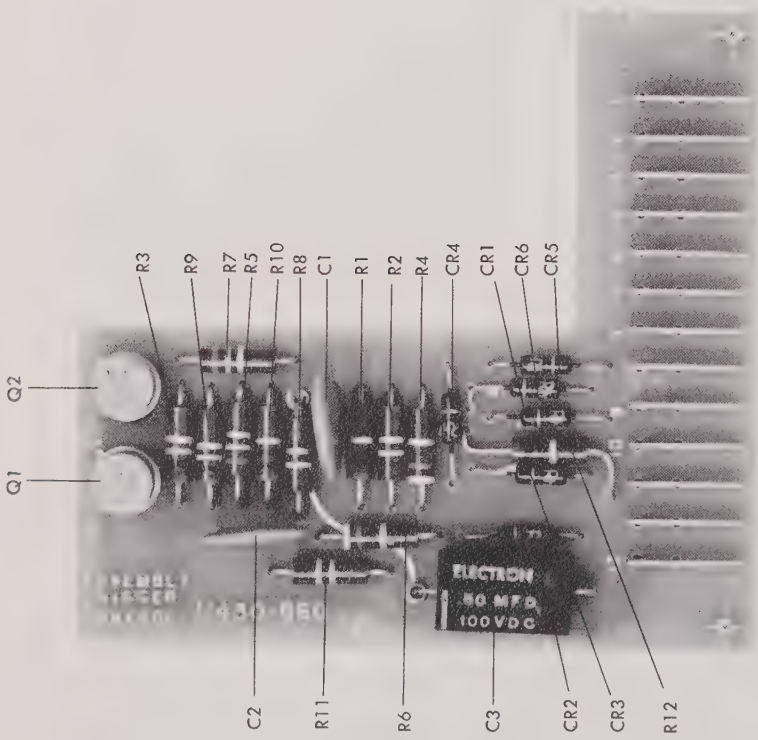


Figure 43. Trigger Control Board.

CIRCUIT REFERENCE	PART NUMBER	DESCRIPTION	QTY PER UNIT	MANUFACTURER
C3	ME1-504E	CAPACITOR, 5 Mfd., 100 VDC, Metalized Paper	1	Electron
C1, C2	BT.02	CAPACITOR, .02 Mfd., $\pm 20\%$	2	R.M.C.
R2, R8, R11	EB2241	RESISTOR, 220K, $\frac{1}{2}$ W, 10%	3	Allen Bradley
R5, R7	EB2731	RESISTOR, 27K, $\frac{1}{2}$ W, 10%	2	Allen Bradley
R3, R9	EB1031	RESISTOR, 10K, $\frac{1}{2}$ W, 10%	2	Allen Bradley
R4, R6	EB4721	RESISTOR, 4.7K, $\frac{1}{2}$ W, 10%	2	Allen Bradley
R1, R10, R12	EB1021	RESISTOR, 1K, $\frac{1}{2}$ W, 10%	3	Allen Bradley
CR1-CR6	5003-002	DIODE	6	NLS
Q1, Q2	2N1374	TRANSISTOR	2	T.I.

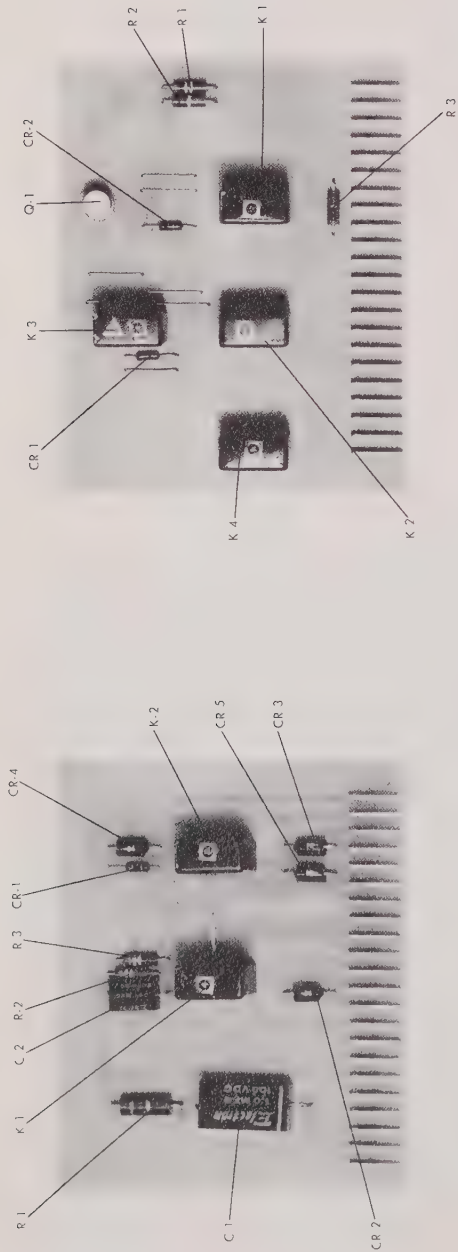


Figure 44. Two-relay and Four-relay Boards.

11420-830

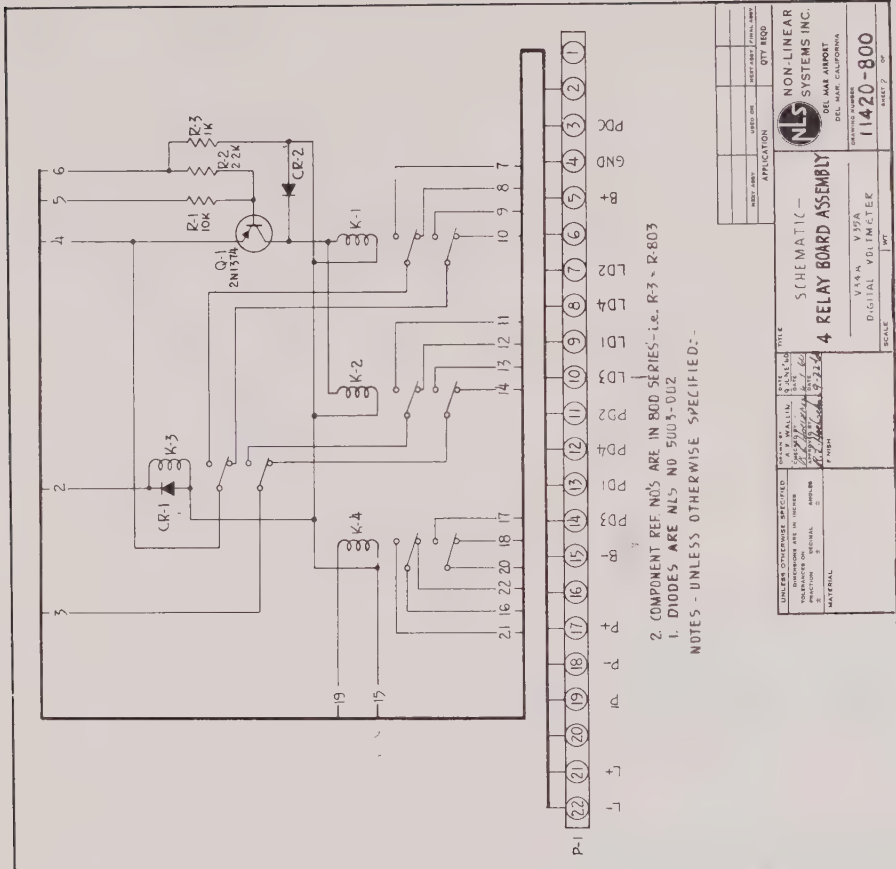
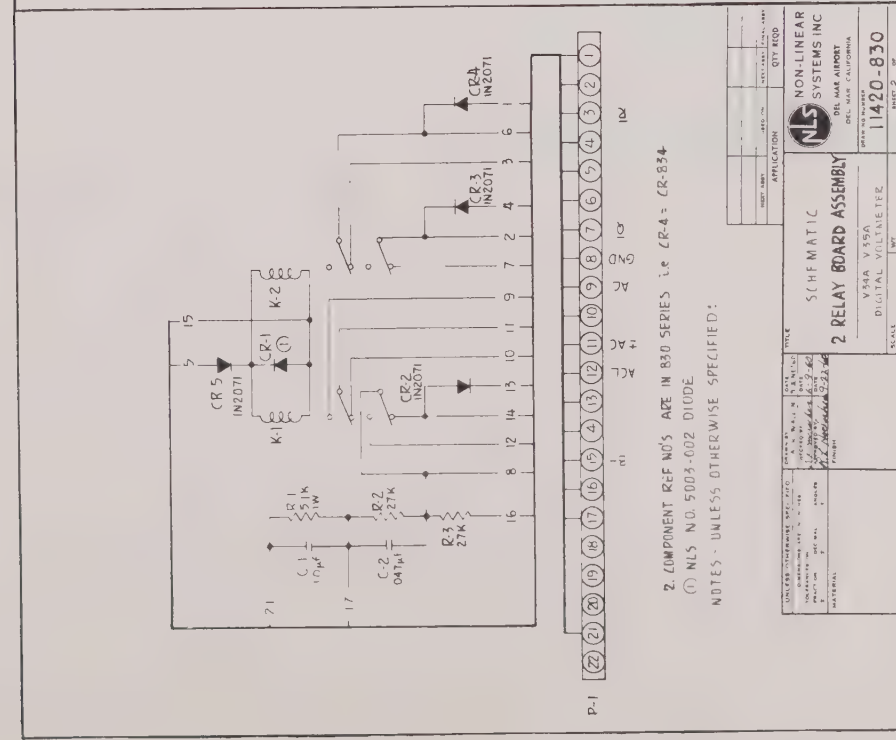
ASSEMBLY, 2-RELAY

CIRCUIT REFERENCE	PART NUMBER	DESCRIPTION	QTY PER UNIT	MANUFACTURER
K1, K2	5005-002	RELAY	2	NLS
R2, R3	EB2731	RESISTOR, 27K, 1/2 W, 10 %	1	Allen Bradley
R1	GB5125	RESISTOR, 5.1 K, 1W, 5 %	1	Allen Bradley
C1	ME1-105	CAPACITOR, Metalized Paper, 1 Mfd., 100 VDC	1	Electron
C2	ME2-473E	CAPACITOR, Metalized Paper, .047 Mfd., 200 VDC	1	Electron
CR2-CR5	1N2616	DIODE	4	Motorola
CR1	5003-002	DIODE	1	NLS

11420-800

4-RELAY BOARD

CIRCUIT REFERENCE	PART NUMBER	DESCRIPTION	QTY PER UNIT	MANUFACTURER
K1-K4	5005-002	RELAY	4	NLS
R1	EB1031	RESISTOR, 10K, 1/2 W, 10 %	1	Allen Bradley
R2	EB2221	RESISTOR, 2.2K, 1/2 W, 10 %	1	Allen Bradley
R3	EB1021	RESISTOR, 1K, 1/2 W, 10 %	1	Allen Bradley
CR1, CR2	5003-002	DIODE	2	NLS
Q1	2N1374	TRANSISTOR	1	T.I.



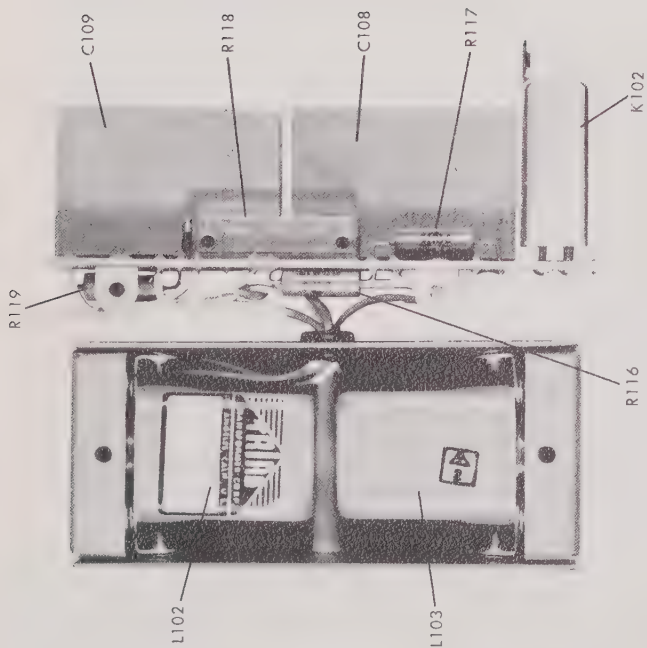
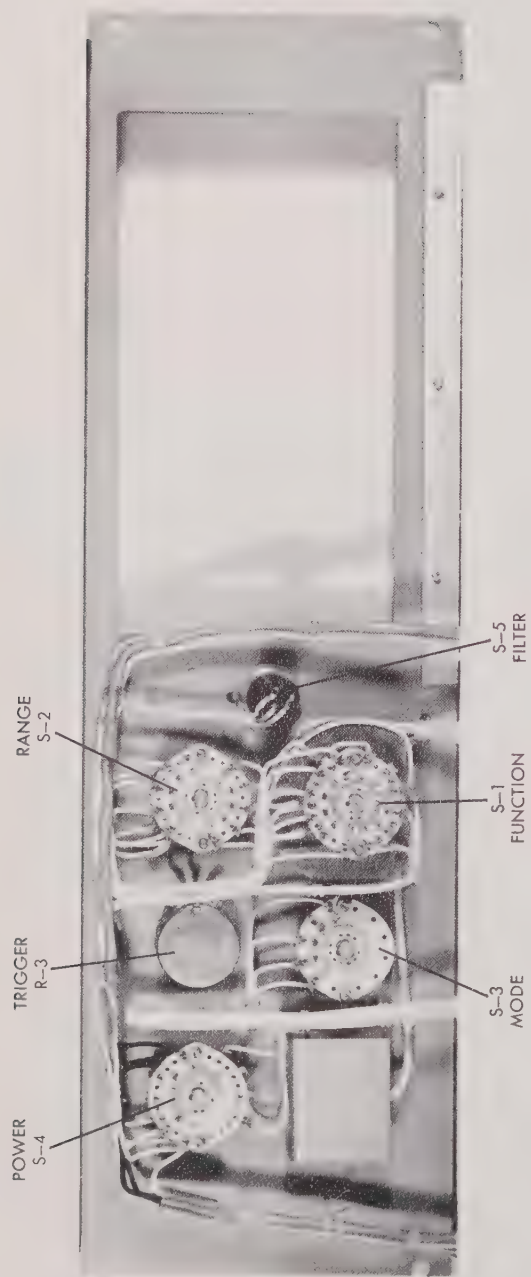


Figure 45. Input Filter.

11430-150		FILTER ASSEMBLY			
CIRCUIT REFERENCE	PART NUMBER	DESCRIPTION		QTY PER UNIT	MANUFACTURER
K102	5005-003	RELAY		1	Babcock
L102-3	15594	CHOKE		2	Triad
C108-9	ZDP-1816	CAPACITOR, 1 Mfd., 1 KV		2	Elpac
R116	MDB	RESISTOR, 27.4K, 1/4 W DC		1	IRC
R117	MDB	RESISTOR, 12.7K, 1/4 W DC		1	IRC
R119	MDB	RESISTOR, 10K, 1/4 W DC		1	IRC
R118	275-202	POTENTIOMETER, 2K		1	Bourns

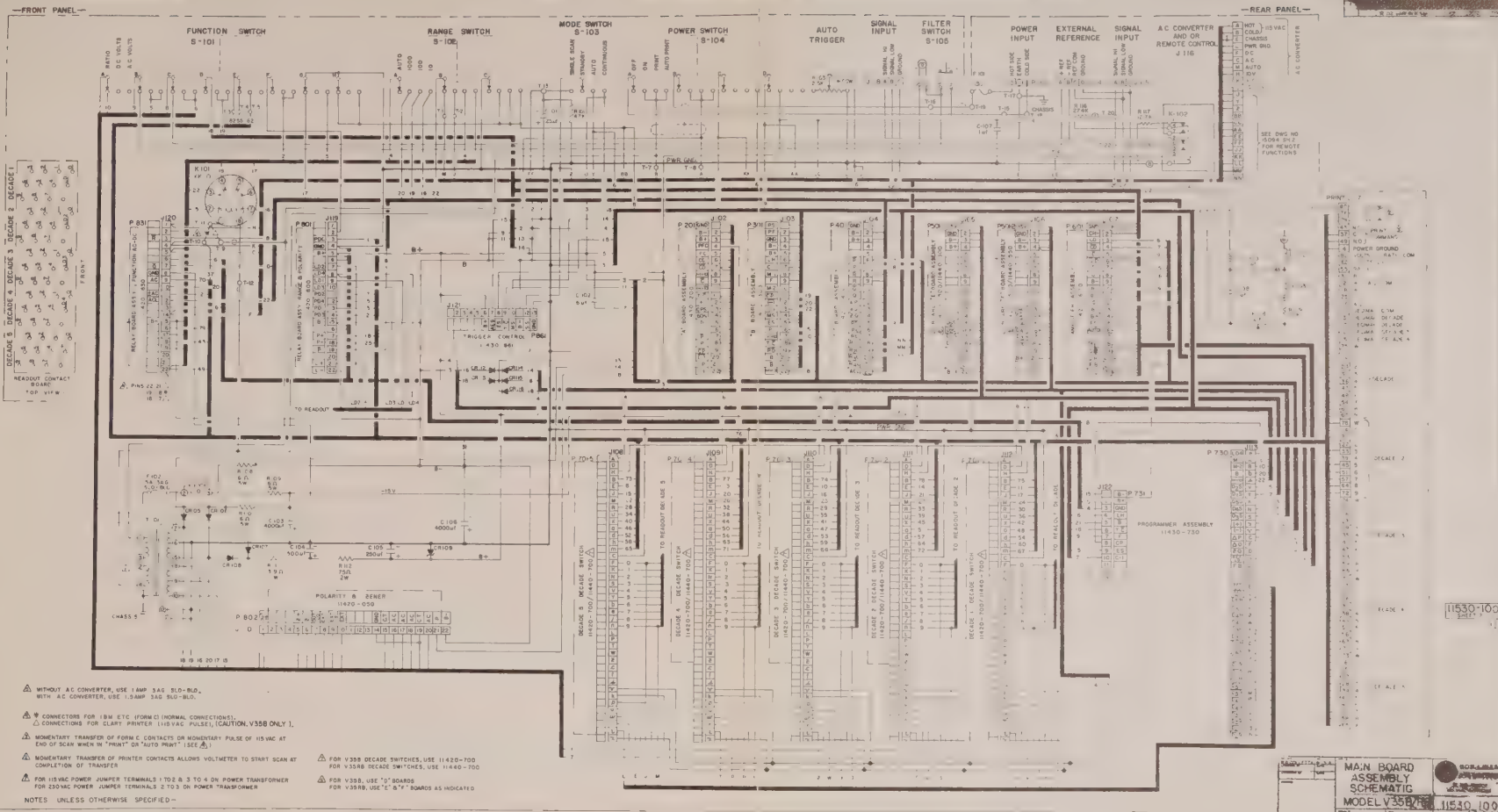
SEE SCHEMATIC 11530-100

ON PAGE 55



11530-100 FACADE, MAIN BOARD ASSEMBLY; SEE ALSO PAGE 58.

CIRCUIT REFERENCE	PART NUMBER	DESCRIPTION	QTY PER UNIT	MANUFACTURER
R3	11420-111	POTENTIOMETER, Trigger Level	1	NLS
S1	11420-122	SWITCH, Function	1	NLS
S2	11420-123	SWITCH, Range	1	NLS
S3	11420-121	SWITCH, Mode	1	NLS
S4	11420-120	SWITCH, Power	1	NLS
S5	WC 1868	SWITCH, Input Filter	1	NLS

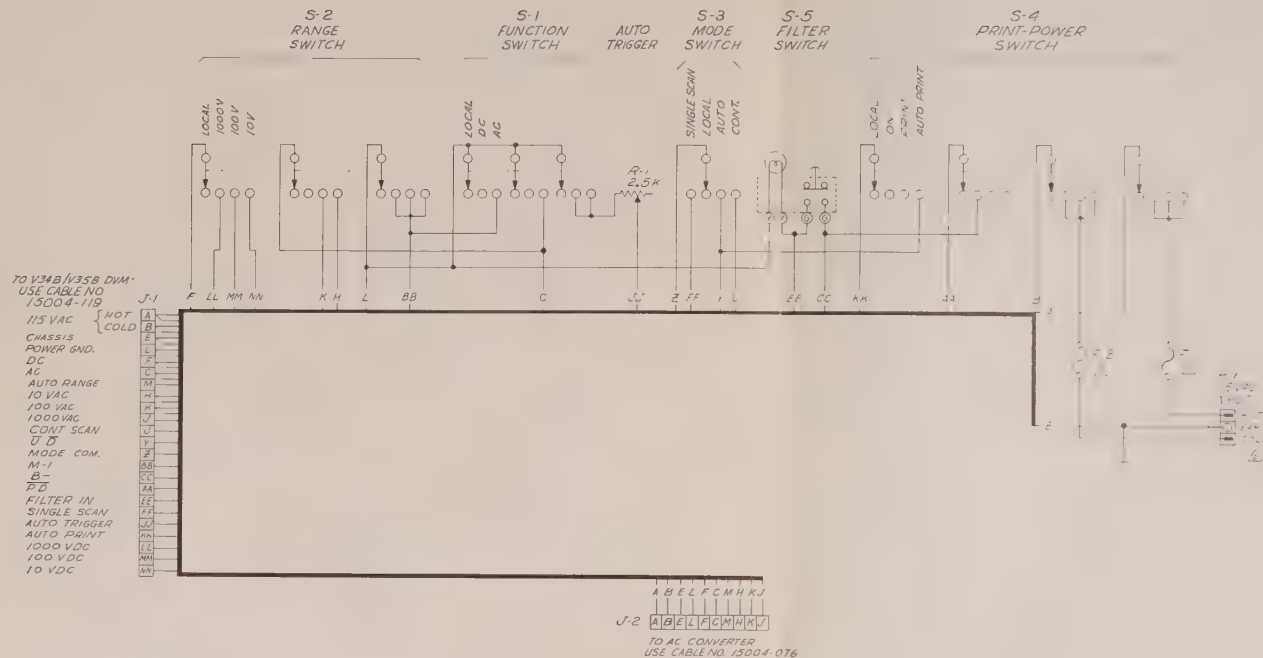


DRAWING NUMBER		15004-125	
REVISIONS			
REV.	APPROV.	DESCRIPTION	DATE
1	A.	ADDED AN3057-6A, 323932, #465B, C4, D, #1410-C1 FROM 2 REOD TO 1 REOD, #465C FROM 1 REOD TO 2 REOD	
97-3106A 145 25-426 AN3057-6A RG122U 12' REOD. 6" TO REF (RED BANANA PIN) #465B TO REF (YELLOW BANANA PIN) #465C TO REF. COMMON (BLACK BANANA PIN) #465B *20 BLACK STRANDED 6' REOD BLACK VINYL SLEEVE VIOS 5/16" ID, .025 WALL 6' REOD QTY INCLUDED WITH THIS CABLE 1 #1410-C1 SAFE-T-KLIP - BLACK 2 #1410-C2 SAFE-T-KLIP - RED 1 #332-A SPADE LUGS, BIRNBACH			
H4-03626		APPLICATION	QTY REQD.
CABLE, EXTERNAL REFERENCE		NON-LINEAR SYSTEMS INC DEL MAR AIRPORT DEL MAR, CALIFORNIA DRAWING NUMBER 15004-125	
SCALE		WT	
DRAWING NUMBER			
15004-125			
REVISIONS			
REV.	APPROV.	DESCRIPTION	DATE
1	ALL	ADDED AN3057-6A, #465B, #465C, #1410-C1 FROM 2 REOD TO 1 REOD, #465C FROM 1 REOD TO 2 REOD	7-5-62
AN3057-6A 323932 2 REOD. RG122U 12' REOD. 6" SIGNAL HIGH (RED BANANA PIN) #465B SIGNAL LOW (BLACK BANANA PIN) #465C AMPL. GRD. (BLUE BANANA PIN) #465B *20 BLACK STRANDED 6' REOD BLACK VINYL SLEEVE VIOS 5/16" ID, .025 INCLUDED WITH THIS CABLE #1410-C1 SAFE-T-KLIP - BLACK #1410-C2 SAFE-T-KLIP - RED #332-A SPADE LUGS, BIRNBACH #31 ALLIGATOR CLIP BIRNBACH			
H4-03626		APPLICATION	QTY REQD.
CABLE, INPUT		NON-LINEAR SYSTEMS INC DEL MAR AIRPORT DEL MAR, CALIFORNIA DRAWING NUMBER 15004-126	

11530-100 MAIN BOARD; SEE ALSO PAGE 54.

CIRCUIT REFERENCE	PART NUMBER	DESCRIPTION	QTY PER UNIT	MANUFACTURER
L101	11400-108	CHOKE	1	NLS
T101	11420-109	TRANSFORMER, Power	1	NLS
CR109	3/4M8.2Z5	DIODE, Zener $\frac{3}{4}$ W	1	Motorola
CR107, CR108	1N2616	RECTIFIER	2	Motorola
CR105, CR106	1N1124R	RECTIFIER	2	T.I.
CR112, CR116	5003-002	DIODE	5	NLS
R101	EB4721	RESISTOR, 4.7K, $\frac{1}{2}$ W, 10%	1	Allen Bradley
R108, R109, R110		RESISTOR, .6 Ohm, 5W, 1%	3	P.R.C.
R111	GB39G1	RESISTOR, 3.9 Ohm, 1W, 10%	1	Allen Bradley
R112	GB9101	RESISTOR, 75 Ohm, 2W, 10%	1	Allen Bradley
C107	ME2-105	CAPACITOR, 1 Mfd., 200 VDCW	1	Electron
C102	5002-002	CAPACITOR	1	NLS
C101	52RM25	CAPACITOR, 25 Mfd., 25 VDCW	1	Ind. Cond.
C103, C106	1B1246A	CAPACITOR, 4000 Mfd., 25 VDCW	2	Ind. Cond.
C104, C105	1B1249	CAPACITOR, 3X250 Mfd., 50 VDCW	1	Ind. Cond.
K101	KRP-11D	RELAY	1	P.B.

REVISIONS			
REV.	DATE	DESCRIPTION	BY
1	11-7-60	REVISED TO 15004-119	11-7-60



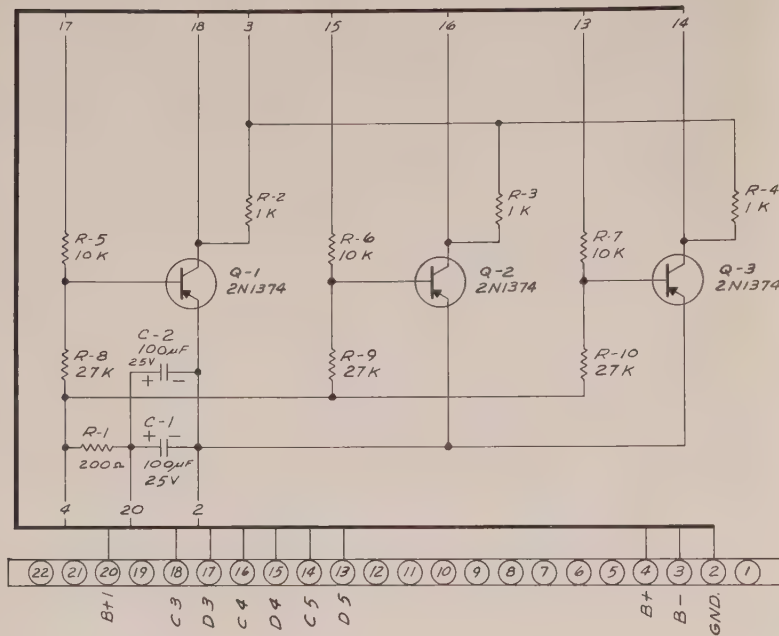
15094 2x2

- THIS UNIT IS AN ACCESSORY, NOT A PART OF THE V34B/V35B;
THIS DWG. IS INCLUDED WITH THE V34B/V35B DWGS. FOR REF. ONLY.
- REMOTE CONTROL OF THE RATIO FUNCTION IS NOT AVAILABLE.
- FOR REMOTE CONTROL THE DVM SWITCHES MUST BE SET AS FOLLOWS: FUNCTION TO "DC", MODE TO "STANDBY",
AUTO TRIGGER TO "MAX", RANGE TO "AUTO", POWER TO "OFF", & FILTER "OUT".
- FOR LOCAL CONTROL AT THE DVM, S-1 THRU S-4 MUST BE SET TO LOCAL & FILTER "OUT".
- PLUG POLARIZATION MUST BE OBSERVED.
- FOR REMOTE CONTROL OF V34B/V35B, USE 3AG 1A SLO-BLO FUSE; FOR REMOTE CONTROL OF
V34B/V35B AND THE 125C OR 125E CONVERTER, USE 3AG 1/4A SLO-BLO FUSE.

NOTES-UNLESS OTHERWISE SPECIFIED:

UNLESS OTHERWISE SPECIFIED:		DATE	REV.
DESIGNED BY	DATE	11-7-60	1
APPROVED BY	DATE	11-7-60	1
MATERIAL	PRICE		
SCHEMATIC, REMOTE CONTROL		NON-LINEAR SYSTEMS INC.	
V34B/V35B		DEL MAR, CALIFORNIA	
SCALE		QTY. 100	

REVISIONS			
REV	EFFECT	DESCRIPTION	DATE



11440-550
SHEET 2

UNLESS OTHERWISE SPECIFIED		DRAWN BY R. COLLETTA	DATE 2-9-62
DIMENSIONS ARE IN INCHES		CHECKED BY	DATE
TOLERANCES ON		APPROVED BY	DATE
FRACTION	DECIMAL		
MATERIAL		FINISH	

TITLE SCHEMATIC "F" BOARD		NON-LINEAR SYSTEMS INC. DEL MAR AIRPORT DEL MAR, CALIFORNIA
DRAWING NUMBER V34RB/V35RB		
SCALE	WT	SHEET 2 OF 11440-550



DIGITAL VOLTMETERS

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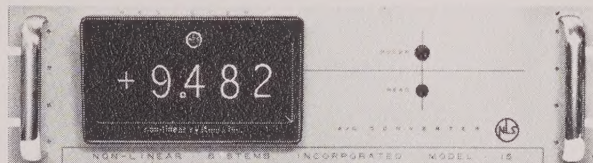
dealing with a company that's been in the DVM business for more than a decade—unmatched servicing follow-through, use-proven design superiority, and uncompromising instrument quality. Contact any of the 19 NLS sales and service offices for complete engineering information on standard instruments and custom instrumentation systems.

INSTRUMENT SELECTION GUIDE

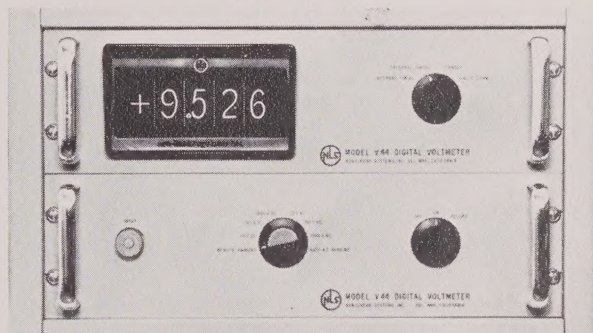
To Measure	Model	Digits	Speed, Sec./Reading	Range	Type of Digital Output	Price
Volts, Ratio and Ohms	M25	5	1.1 constant	100 μ v-1kv. .00001:1- 99.999:1 .1 Ω -1 meg.	Decimal voltages	\$5,985
	M24	4	.33 constant	100 μ v-1kv. .0001:1- .9999:1 .1 Ω -1 meg.	Decimal voltages	\$5,585
Volts and Ratio	V35B	5	2.3 max.	100 μ v-1kv. .00001:1- .99999:1	Decimal contacts	\$3,985
	V35RB	5	2.3 max.	100 μ v-1kv. .00001:1- .99999:1	Decimal voltages	\$3,385
	484A	4	1 avg.	1mv-1kv. 00.01%- 99.99%	Decimal voltages	\$1,460
	RS2	4	1 avg.	1mv-1kv. 00.01%- 99.99%	Internal printer	\$3,635
Volts	15	4	67x10 ⁻⁶ constant	100 μ v- 100v.	B-C-D or binary volts	\$4,985- \$5,485
	V44	4	5x10 ⁻³ constant	1mv-1kv.	Decimal & B-C-D volts	\$6,185
	CH2	4	1x10 ⁻² approx.	1mv-1kv.	Decimal & B-C-D volts	\$6,585
	V64B	4	0.75 avg.	1mv-9.999v. special to 1kv.	None	\$885
Voltage Ratio	R65A	5	1.5 avg.	00.001%- 99.999%	None	\$2,135
	R65B	5	1.5 avg.	00.001%- 99.999%	Decimal voltages	\$2,335
Millivolts	V60	4	1.5 avg.	10 μ v- 99.99mv.	None	\$1,660
	V60A	4	1.5 avg.	10 μ v- 99.99mv.	Decimal voltages	\$1,960
Ohms Deviation	D024	4	.33 constant	00.01%- 99.99%	Decimal voltages	\$5,585
Ohms	784	4	1 avg.	.1 Ω - 10 meg.	Decimal voltages	\$1,460
Digital-Analog	16	4	4x10 ⁻⁶ constant	.001v- 9.999v.		\$3,085
AC, Low-Level DC, Data Logging, Go/No-Go Testing	Plug-in accessories are available for high accuracy measurement of AC and low-level DC, data logging, and go/no-go testing. Also, NLS offers a wide range of custom instrumentation for special applications.					

Prices and specifications are subject to change without notice. Prices F.O.B. destination U.S.A.

Accuracy is $\pm 0.01\%$ of reading ± 1 digit except for millivoltmeters which have accuracy of $\pm 0.1\%$ of reading ± 1 digit (precision is ± 1 digit). V35B-V35RB ratio accuracy is $\pm 0.005\%$ of reading or ± 1 digit. Input impedance is generally 10 meg for voltage measurements, 1,000 meg for ratio (10 meg on M25's two highest ratio ranges). Input impedance of Models 15 and 15B is 625 ohms/volt. Decimal digital outputs are 10 lines/decade.



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